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NUMBER 1

BOILING WATER INJECTIONS INTO THE THYROID GLAND FOR HYPERTHYROIDISM¹

BY MILES F. PORTER, A.M., M.D., F.A.C.S., FORT WAYNE, INDIANA
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In previously published papers^{2 and 3} I have given in detail the history of the development of this method of treating hyperthyroidism including the experimental and clinical data up to the time of publication of those papers. My purpose in the present paper is to review in abstract the experimental work to bring the clinical experience up to date as nearly as possible and on this basis to arrive at a reliable estimate as to the value of the method, its indications and limitations and to give the technique of the procedure.

Initial experiments. These were performed on dogs by my assistants Drs. Beall and Mouser and by Dr. W. D. Gatch of the Indiana University School of Medicine. The experiments consisted of injections of boiling water into the thyroid subcutaneously and through an incision followed by examination as to the immediate and remote effects of the procedure. These experiments demonstrated (1) the safety of the procedure, (2) that the immediate effect of the injection of the boiling water was a destruction of the gland cells and colloid which is later replaced by connective tissue, (3) that a goiter in the dog can by this means be cured permanently.⁴

Figures 1 and 2 show the immediate effect of injection of hot water in a dog's thyroid. These illustrations were made from sections taken from the tissue at the site of the injection. Figure 3 shows a section made from a point somewhat removed from the point of injection. Figure 4 is a picture made from a specimen taken eight weeks after the injection and shows a great amount of fibrosis.

Experiments on human goiters. These experiments were made in our own laboratory and that of Dr. Gatch. Like experiments have been done in the Mayo laboratory also but I have no details of their findings. The experiments consisted of the injection of boiling water into freshly removed human goiters and immediate examination of microscopical sections. The findings were the same as in the thyroid of dogs, viz. destruction of cells and colloid (Fig. 5).

I also had sections made of a goiter which was removed after the hot water treatment (four months after last injection and ten months after first). Figure 6 shows a picture made from this specimen and it will be noted that the findings are practically the same as those in the specimen (Fig. 4) taken from the dog eight weeks after the injection.

Clinical experience. This covers over one hundred cases, some of which were in my own practice but the majority in the practice

¹ J. Am. M. Ass. 1915, no.

² J. Am. M. Ass. 1914, 23.

³ Beall, I. Mouser, (see Experiment 1006) J. Am. M. Ass.

⁴ 1915, 1.

¹ Read before The Chicago Surgical Society, November 6.

(See discussion p. 3.)



Fig 5 Case of exophthalmic goiter female age 35. Thyroid removed and soon thereafter the gland was injected with hot water and the gland thus treated shows some necrosis of the epithelium here and there with absence of the colloid substance in some of the follicles and loss of its characteristic in others. Many of the alveoli tend to be obliterated and the interstitial connective tissue light colored mass. (B W Rh my.)



Fig 6 Section of thyroid removed from female patient after treatment by injections of hot water. Sections made four months after last injection and ten months after first. The pre-injection picture is one of connective tissue hyperplasia. Note the thick strand of scar tissue connective tissue constricting and compressing the parenchyma thereby completely obliterating the gland structure. (B W Rh my.)

of other surgeons. I am especially indebted to Dr Robert T. Morris of New York, Dr W. Wayne Bibcock of Philadelphia and Dr J. C. O'Day of Portland, Oregon, for their kindness in reporting to me the results of their work. There have been no deaths or serious results reported from the treatment.

Dr Bibcock reports a fatality following the injection of hot water as follows: A patient who seemed in fair condition was brought to the operating room for ligation or lobectomy when he became intensely excited and the pulse rate increased from about 120 to about 160. The patient was nearly insensible from the excitement. The operation therefore was not attempted and once he was injected with boiling water and the patient returned to bed. Tachycardia and excitement continued and three or four days later the patient died.

Dr Bibcock further says: During the past year we have prepared all patients with intense hyperthyroidism for operation by our method of injecting boiling water. It is my opinion that in this way one may

accomplish as much in a week as by putting the patient to bed for six weeks to three months. In my opinion there is no question that the injection produces a more intense effect than a double ligation. The reason for this is obvious when one does a lobectomy a week or ten days after the injection and finds that there has been to a large degree arrest of circulation in half of the thyroid with extensive necrosis. In a few instances no secondary operation was performed yet there was marked relief from symptoms which had persisted until the present time. As a rule however we give the injection to prepare the patient for a lobectomy. At least one of our patients prepared for lobectomy by the injection had been refused operation in other clinic. I have given the injection a number of times in the office and the patient has returned to her home unharmed and without any harm. The patients with more intense symptoms have all of course been in the hospital.

My own experience is quite in accord with that of Dr Bibcock. It infrequently



Fig 7 Hyperplastic goiter with adenomatous enlargement. Moderate symptoms of hyperthyroidism



Fig 8 Mixed type of goiter. Note central white mass of fibrous tissue with cyst at top surrounded by areas of hyperplasia (darker areas) and colloid (lighter areas)

patients who have had the injection treatment with a view to future thyroidectomy find themselves so much improved that they refuse further treatment as in Case 18 reported in a former paper.

As to the relative efficiency of the boiling water injection and ligation there seems to be no longer any reason for doubt. I quite agree with Babcock that an injection will accomplish more than a double ligation and also that one can accomplish as much by one injection as can be accomplished by 12 weeks to three months rest treatment.

C. H. Mayo¹ says: "Extreme conditions especially dilatation of the heart may require medical preparation and the operative interference following in cases resistant to treatment should be confined to injection of boiling water into the gland after Porter's plan to hasten improvement."

The relief following the injection usually manifests itself within the first twenty-four or forty-eight hours and some patients show decided improvement in the symptoms tachycardia and tremor immediately. This immediate improvement has been attributed to the psychic effect. Frequently the improvement progresses for a week or two. This is attributed to the strangulation of the cell and blood vessel by the contraction of

the fibrous tissue which is produced by the injection.

The result of an injection depends upon the quantity injected and the kind of goiter one is dealing with. Hyperplastic thyroids of pure type whether the hyperplasia is diffuse or circumscribed respond most certainly. A small circumscribed hyperplasia of either lobe or the isthmus will be materially benefited or cured by a single injection.

Miss W. (Case 16 reported in a former paper²) had a small but pronounced enlargement of the isthmus with pronounced symptoms of thyrotoxicosis including tremor, tachycardia and amenorrhoea but no exophthalmos. She was cured by one injection and has remained well ever since, now about three years. A larger goiter but of the hyperplastic type would be materially benefited or cured only by several injections or one very large one.

The case of Miss J. H. (Case 6 reported in the same paper) who had a very large goiter of mixed type required nine treatments fifteen injections in all to bring her weight which was 86 pounds at the beginning up to normal, cause the reappearance of her menses and in short produce almost as perfect a cure as can be obtained by thyroidectomy. I subsequently removed this patient's goiter for cosmetic reasons. This operation was followed by slight further improvement especially in the exophthalmos. She has a permanently damaged heart.

These two types of goiter are shown in Figs 7 and 8. These plates were made in color from freshly removed specimens. Figure 7 made from a gland removed from a patient with moderate hyperthyroidism shows a hyperplastic goiter with a distinct adenomatous enlargement. An injection into any part of the gland would be followed by marked amelioration of symptoms.

On the other hand Fig 8 which was made from a gland removed from a patient with mild symptoms of thyroid intoxication shows a large amount of fibrous, some colloid, some cyst formation and scattered here and there small areas of hyperplasia. For reason that are patent such a case would require numerous injections to produce pronounced benefit. Moreover, some of the injections would be followed by no noticeable benefit at all. For instance, an injection into the fibrous tissue or into the cyst would be practically useless, so far as amelioration of symptoms is concerned. That the injection will produce a marked diminution in the size of the gland is proved by the experience of Morris O Day and myself. The diminution in size like the abatement of the symptom will be most marked in the vascular hyperplastic type of goiter though according to Morris it is often marked in the cystic type.

I have never used the injection for the sole purpose of reducing the size of the tumor. Given a case wherein one lobe of the gland has been removed with later hypertrophy of the remaining lobe accompanied by an exacerbation of the symptom of thyrotoxicosis and we may depend upon the injection of boiling water to benefit or cure the symptom and to cause the tumor to disappear or to stop its growth. Such a case is Case 8 in the paper above referred to.

It was formerly thought that the injection would cause the gland to become adherent and thus increase the difficulty of operation in case removal was subsequently done. We now know that this fear of adhesions was unfounded. Where the injection are made well into the substance of the gland no adhesion follows. If numerous injections are made and particularly if some are made near the surface of the gland some adhesion will be found if

thyroidectomy is subsequently done but as above indicated the formation of adhesion as a result of the injections may be regarded as a negligible factor.

Technique. An all glass syringe of 10 ccm or 20 ccm capacity is best. The greater the capacity of the syringe the longer the heat of the water is retained. The needle should be long flexible and rather fine. The syringe is boiled with the water over a gas or alcohol flame by the side of the table or bed on which the patient is lying. After proper cleansing the areas to be injected are infiltrated with one per cent novocaine. The filled syringe is removed from the water which is actually boiling and the injection quickly made. From five to twenty ccm are injected according to the size of the lobe. By partially withdrawing the needle and reinserting it contiguous areas may be injected through one puncture.

Dr Babcock has made injections in his office but thinks as I do that this is not to be commended. I prefer to have the patients remain quiet for one half hour or an hour after the injection. The needle puncture are covered for a couple of hours with gauze wrung out of alcohol. Sloughing has never occurred and the small eschar on the skin produced by the needle are not permanent. The needle should penetrate the skin as nearly at right angles as possible in order to reduce the burning to a minimum. I have been in the habit of handling the syringe with the aid of forceps and gauze but in the future shall use Babcock's method which is much better. He wears three pairs of gloves, first a pair of rubber gloves covered with thick cotton gloves and over all a pair of rubber gloves.

Most patients complain immediately after the injection of a feeling of fullness in the goiter and some pain in the side of the occiput but the discomfort is really trifling.

The injections are to be repeated until the desired effect is attained. If one is using the treatment preparatory to thyroidectomy then it is well to repeat the injections every two or three days if more than one is necessary but if one has decided to try to effect a cure by this means it will be better to wait a week or



ten days before repeating the injections for as indicated above while the improvement is usually marked within the first forty eight hours it does not reach the maximum for ten days or two weeks

It is better especially in the larger goiters to inject two three or more areas at one sance than to make the injections at interval Indeed I may say that the tendency as experience grows to make larger and multiple injections at a single sance rather than to make smaller and single injections and repeat the sances In some cases with small ill defined glands it is better to make the injections through a small incision in the midline done under local anesthesia which will enable the operator to do the work under guidance of the eye

The clinical and experimental facts seem to warrant the following conclusions

1 Injections of boiling water into the gland should be substituted for the so called medical treatment in patients with small thyroids and moderate symptoms of hyper thyroidism

2 This method is also peculiarly well adapted to the treatment of patients with moderate or severe symptoms and relatively small glands and especially to cases wherein the hyperplasia is circumscribed It is therefore well adapted to the treatment of patients who have had a lobectomy done and are still suffering from symptoms of hyper thyroidism with hypertrophy of the remaining lobe

3 Patients with large goiters and extreme symptoms of hyperthyroidism should be treated with the injections until they become safe surgical risks and then have the gland removed

4 Boiling water injections are not recommended in non toxic goiter In such cases as in patients with large goiters and toxic symptoms but who are good surgical risks thyroidectomy should be the chosen method of treatment

5 In substernal hyperactive goiters the removal of which would be hazardous boiling water injections under guidance of the eye should be tried

THE DIAGNOSIS AND TREATMENT OF OSTEOMYELITIS¹

BY JIALVERN B. CLOFTON, M.D., F.A.C.S., SAINT LOUIS

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From the Surgical Department of Washington University

I HAVE selected the topics of diagnosis and treatment of this disease because they have appealed to me as the most important phases for discussion. The etiology and pathology have been carefully and thoroughly worked out and we can accept them as nearly closed chapters but most new cases present some question of diagnosis and the treatment of the cases must always be considered with the view of the earliest relief of symptoms by such measures as will ultimately give us the best functional results in the diseased extremity.

The following observations are based on our experience with thirty one cases treated in the past four years. Nine of these cases were admitted in the acute stage. So far there have been no deaths. The femur was involved 23 times, the tibia 11 times, the humerus 6 times, the radius 3 times. In nine cases the femur alone was involved, in eight cases the tibia alone, in two cases the humerus alone, and in one the fibula alone; that is, in nineteen cases only one bone was involved. There were fifty bones involved in the thirty one cases. The hips were involved in fifteen cases, six of the hip cases gave symptoms similar to tuberculosis of this joint and three of these cases had been treated for tuberculous hip disease.

DIAGNOSIS

In the acute stage the general sepsis may so mask the local lesion that it is impossible to locate the trouble in the bone or the bone lesion may not be suspected. In these cases typhoid fever is frequently diagnosed and our histories show a fair proportion in which the bone abscess has been thought to come from this infection. In the earliest stage the

leucocyte count usually high (from 20,000 to 30,000) should cast doubt on the typhoid diagnosis and an earnest search made for the bone lesion. The pain caused by the inflammation inside the unyielding bone is usually one of the earliest symptoms but in the child the intoxication may be so overwhelming that pain sense is overshadowed and only the most systematic examination of the bones will discover the tender shaft. If pain is felt in the neighborhood of several joints at the same time either developing simultaneously or in sequence the mistaken diagnosis of infectious arthritis may be made but in osteomyelitis the infection is usually of a less intense character and the number of joints involved are fewer. Even in the earliest stage of bone infection there is thickening about the shaft which is also very tender to the slightest pressure and the lesser pain on manipulation of the joint may serve to rule out infectious arthritis. The mistaken diagnosis of infectious arthritis is more likely to occur in infections of the bone that do not early break through the cortex to form swellings beneath the periosteum. There is also that class of cases in which the infection begins in the diaphysis near the epiphysis, and which by their toxins or organisms cause the swelling in the adjacent joint. Here the appearance of joint disease is often most deceiving, developing the picture either of a septic arthritis or if the inflammation is not of a virulent nature of tuberculosis. In osteomyelitis of the neck of the femur the symptoms of tuberculous hip disease may be nearly reproduced but bearing in mind the chronic nature of tuberculosis the diagnosis is ordinarily not difficult to make. Although we have been on the lookout for it we have never seen tuberculosis of the shaft of the bone; it is practically always of the epiphysis and rarely gets beyond the epiphyseal line. In children the tuberculin reaction of von

¹ A patient came into the hospital suffering from a septicemia which was later found to be an osteomyelitis of the femur. The patient was very ill at the time of admission and the diagnosis was not made until after a few days. The patient was then found to have a large abscess in the bone and the diagnosis was confirmed. The patient was treated with antibiotics and the abscess was drained. The patient recovered and was discharged.

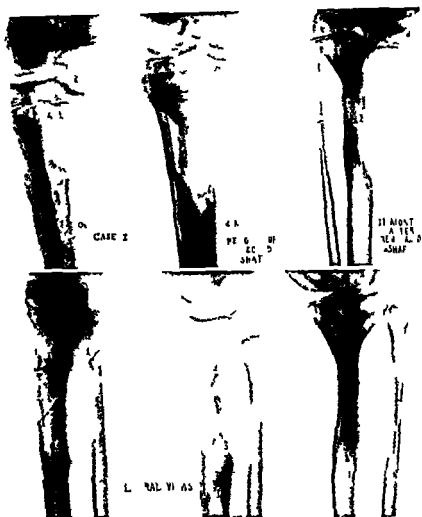
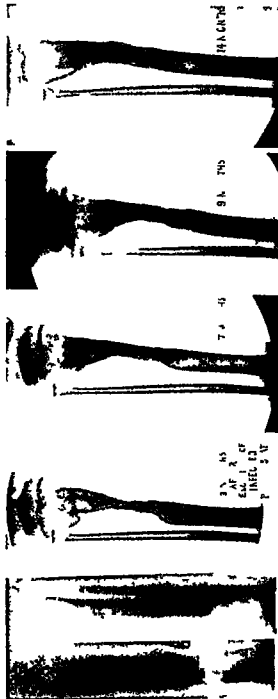


Fig Case 2 shows complete regeneration of bone after subperiosteal resection

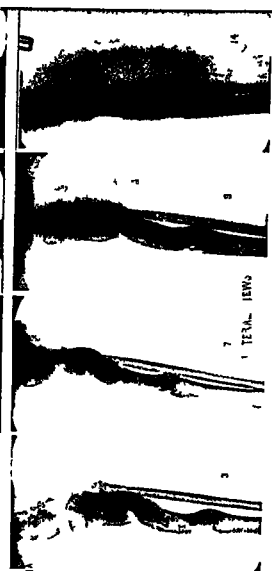
Pirquet is of value though several of our cases of osteomyelitis have a positive reaction due to tuberculosis of other parts than the bone. The appearance of an abscess either under the periosteum or in the soft parts usually makes the diagnosis certain should the case have progressed so far without being determined but there are some slow osteomyelitic processes notably about the lower end of the femur that at times may be diagnosed as sarcoma while on the other hand there are certain new growths of the shaft of the bone that give a very suggestive impression of chronic osteomyelitis.

But most of these situations of doubt have

arisen in the earlier stages of the disease and can usually be cleared by X-ray study. In the first few days of osteomyelitis we have been unable to see any change in the bone shadow but later there comes a general cloudiness due to the hyperaemia and the beginning absorption of bone trabeculae which make the picture more or less characteristic. This absorption and loss of definition is at first in the shaft near the epiphyseal line. As progress is made the lacework of the bone trabeculae of the cancellous bone and the medulla are destroyed and the periosteum later is irritated into activity that after a few weeks shows a shadow of a linear arrange-



CASE II
OSTEOMYELITIS OF TIBIA



1 K Case shows complete resection of subperiosteal reaction

ment of newly formed bone salts and this thickening may extend some distance along the shaft beyond the part where there is medullary destruction. Such periosteal thickening is characteristic is never seen in tuberculosis and is evidence that we are not dealing with malignancy. The medulla may show irregular hollows with ragged outlines that contain bone detritus. Sequestra come as a later stage and while not always formed are only found in osteomyelitis. Should the blood supply of the shaft or any part of it be cut off by the swelling within and without the bone tube the shaft dies and it is left to show later as a very dense mass. After the sequestrum has been removed and the infection is resolving the image clears and the bone becomes more opaque as sclerosis of a compensatory nature seeks to strengthen the weakened part. We may also find in old conditions an abscess of the bone with irregular outlines containing either a sequestrum or without anything but minute bone detritus in the granulations. In tubercular disease the epiphyses are involved and instead of the clear outlines there is a fluffy effect with blurring and the cancellous tissue is difficult to detect and from a peritrochanteric point of view the X-ray plates of tuberculosis are disappointing (cavities are not so clearly outlined because of the deficiency of mineral salts and we do not see the sclerotic changes with excessive mineralization seen in osteomyelitis). Syphilis of the joint gives a shadow in nearly all respects identical with tuberculosis but in syphilis of the shaft the X-ray shows an irregular thickening and a mottled appearance of the bone the periosteum showing a very characteristic furring quite unlike the regular laminated appearance in osteomyelitis. There are never any clear cut cortical sequestra. The uppermost thickening of the tibia in congenital syphilis often gives a regular smooth outline but at times it can be shown that the primary lesion is in the medulla. In malignancy of the bone is shown by the X-ray there is a ragged irregular ossification and the effect is potted and not uniform. Irregularity in every form of bone malignancy is a prominent feature. In endosteal growth the rapid expansion of the bone hull is evident. It is



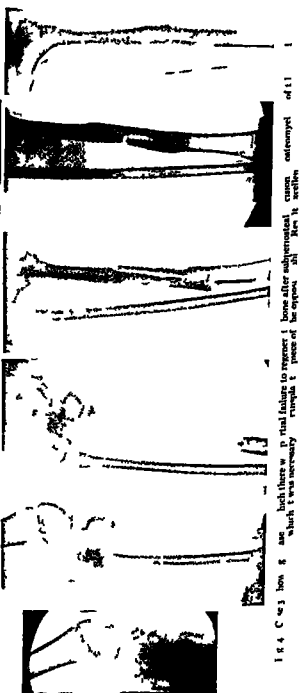
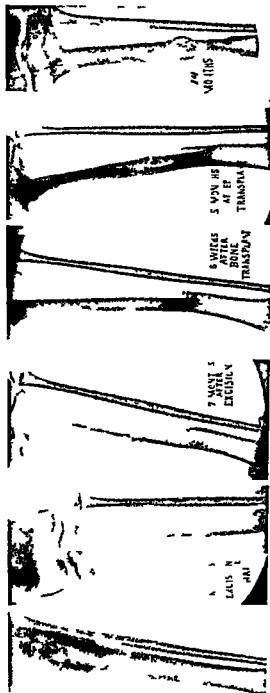
Fig. 3 Case 2 comparing legs two years after resection
Note the contraction

easy in most instances to rule out osteomyelitis in the diagnosis of exostoses. The X-ray diagnosis of bone-cysts or giant-celled sarcoma of bone is difficult except in the later stages. We regard the X-ray as invaluable in all work on the bones particularly so with osteomyelitis and therefore insist on a picture that gives us clear and definite detail before we undertake treatment.

TREATMENT

- 1 In the acute stage
Drainage of medulla
- 2 In the subacute stage
 - (1) Humerus and femur drainage and sequestrotomy
 - (2) Tibia fibula radius ulna upper osteotomy
- 3 In the chronic stage
 - (a) Sequestra removal drainage with iodoform wax
 - (b) Brodie abscess evacuation closure over blood clot or iodoform wax

In the operative treatment of the acute stage of osteomyelitis the greater responsibility rests with the operator because he must do enough to release the pent up infection and refrain from doing too much and endangering



1 2 3 4 5 how the bone after subperiosteal osteomyelitis of the tibia has been treated by the removal of the bone and the insertion of a bone graft.

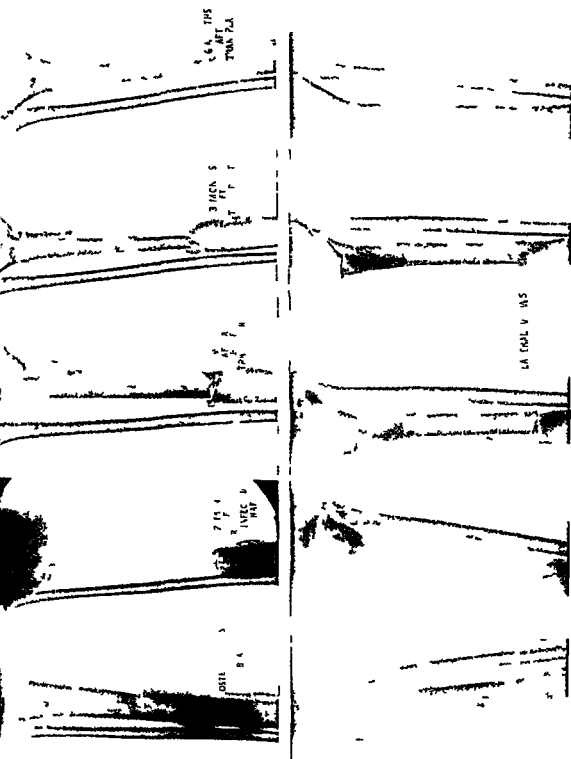


Fig 5 Case 4 showing case 1 which there was a failure to regenerate after suppurative excision from opposite tibia to bridge defect. Excellent result.



FIG. 8. Case 9. Child had both femurs infected. Photographs A and B show last turn of motion after 3 years. A and B show right femur highly involved in acute process. A, October 9, 1903; B, February 5, 1904.

remained down and there was a rapid gain in weight. In the fifth week, there were right cramps with stiffness of the left thigh and muscle spasm just as seen in the berrulosis of the hip. The left leg was put in extension and all symptoms disappeared within a week. After three months an X-ray showed that right thigh gain in bone structure but several small sequestra remained which were removed through small incision. The child developed diphtheria and later chicken pox and was removed to the contagious disease ward where he remained for six weeks. The only untoward symptom of the operation was slight cries evidently from left hip but the X-ray showed so little change in the bone that nothing was done at that time. The child went to Ridge Farm for a month where she gained

strength and the hip improved. She returned to surgery for operation. An X-ray picture showed the neck of the femur about three-fourths of an inch diameter situated in the epiphysis of the head. This was operated February 6, 1903, and gas was used; the neck was four centimeters thick with mill focus. The head and both were lined with burned bone. The hip was infected by a direct contact with the sequestra. A part of the epiphysis was cut out and the cavity allowed to fill with blood clot and the wound closed except for small rubber tissue drainage. Wound healed kindly and was closed in a month. Tissues put into the guinea pig did not develop tuberculous cultures from pus gave at post-mortem. Child was kept in bed with tracheotomy.



Fig 9 Case 6 Osteomyelitis of femur X rays taken at two week ten week and four month later excellent results

after which a cast was applied and at the end of four months from the operation was using the leg in walking. The X ray plates show the condition of both hips at present and the condition of the right femur. She walks without a limp. The flexion and abduction are as free as normal as shown in the photograph. The osteomyelitis of these parts will show how tenacious the infection may be. It is noted that the child was admitted to the hospital in March 1913 when in the best of health and in general condition with a fluctuating mass the size of an English walnut over the left scapula which when opened showed no pus but a gelatinous mass from which staphylococci were grown. It had its origin in a small bone focus of the posterior margin of the scapula which was excised and the wound closed except for a small rubber tissue drain. Healing was rapid.

CASE 12 Children's Hospital No 3726 II VI age osteomyelitis of left femur right humerus

The child was admitted to the hospital December 3, 1913 with the history of a fall five months before. She was able to walk for a few days after which she was confined to her bed and she has remained there since. In the beginning there was pain in the leg and fever and after six weeks she was taken to a hospital and the thigh was incised and pus evacuated. The leg has been draining ever since. She remained in the hospital for four months and got progressively worse losing much weight and becoming

so weak that preparations were made for amputation. The family would not consent to this so the child was brought to the Children's Hospital. Her condition was bad. The left thigh is much swollen from the upper part to below the knee. There is a large opening on the inner side of the thigh from which there is a large discharge of thick yellow pus. There is a fracture of the thigh at the junction of the middle and lower third which allows wide motion. There is over two inches of shortening in the thigh. Cultures show staphylococcus. An X ray shows the femur involved from the lower epiphysis up to a point just below the trochanter. There is a large thin sequestrum of the circumference of the shaft about two inches long. This lies just below the fracture. There is a marked angulation at the fracture. Under general anesthesia the incision was lengthened and a sequestrum two and one half inches long of practically the whole circumference of the femur was removed. Small drains were inserted and after correcting the angulation at the break a plaster cast was applied. Three weeks later the sinuses were swabbed out with gauze and iodoform wax put in. At the end of two months the fracture was solid and the child was walking on the leg at the end of the third month. The child was readmitted July 16, 1913 with a small fusiform swelling of the right humerus above the middle which was without pain or tenderness and which did not disable the arm. The X ray picture showed a small area on

first month the bone lesion has been healing or well. The hip is motionless the femur is healed and the boy is up and about. But during all this time there has been not more than two months in all in which the boy has been free from temperature ranging as high as 101 and 102 in the evenings. For a time his leucocyte count kept constantly above 18,000. By changing the reaction of his urine from acid to alkaline we have been able to overcome some of the infection and he would get better for a time to relapse again. The urinary infection is staphylococcus. Vaccines have been used without effect. His tonsils and adenoids have been removed. No other lesion can be made out to account for the fever. The tuberculin and Wassermann reaction are negative. But despite the fever the boy continues to feel well eat and sleep well and gain in strength.

CASE 8 Children's Hospital No. 3,346 1 L age 10 osteomyelitis of humerus (Fig. 7)

Boy admitted September 29, 1912 had been healthy until three months ago when shoulder began to pain and the shoulder and elbow became swollen in two days. An abscess near the shoulder was opened and continued to discharge. The swelling was not as marked as in the beginning. He is restless and does not keep well. His appetite is good. The movement at the shoulder is painless but any movement at the elbow causes pain. Examination shows a fairly well nourished boy somewhat pale. Chest and abdomen negative. Right shoulder and elbow the only joints involved. Right arm shows marked atrophy of the upper elbow joint allows only a few degrees of motion and this is painful. Supination and pronation in forearm absent. Forearm fixed at a right angle. The shaft of the humerus is very much thickened. About the shoulder four granulomatous wounds discharge thin yellow pus. The acromion is thickened and prominent. The upper end of the humerus is very much enlarged. X-ray picture shows an osteomyelitis involving the whole shaft of the humerus. The head of the bone seems free from change but beginning at the upper epiphysis a line extending downward along the upper third of the bone there is marked thickening which has the contour of a shallow sequestrum. The head of the bone seems to be rather uniformly thickened. The periosteum is raised for about an eighth of an inch all along the shaft. The elbow joint seems also to be the seat of deposit of new bone. There is also some destruction of the ulnar ends of the joint. The bone is excised and the operation was performed October 1, 1912 to excise the sequestrum. The incision was made from the level of the shoulder joint half way down the arm on the outside. The periosteum of the humerus was universally thickened to one-fourth inch and of a consistency that would permit cutting with a heavy scalpel a channel about one half an inch through which the sequestrum was removed. The sequestrum measured four

inches in length and lay in a granulating cavity which was wiped out with gauze. The lower end of the sequestrum extended down to the musculospiral groove but the nerve and the surrounding tissues were not interfered with. A small trephine hole was made to open the lower end of the humerus about one inch above the joint hoping in this way to determine any suppuration of the medulla and to drain it if necessary but no infection was shown. Both bone cavities were filled with Mosetig's wax. The wounds were partly closed with catgut in the muscle and fascia and interrupted silk for the skin leaving about one inch interval between the sutures. There was a moderate amount of discharge after the operation but the wax remained in position. Two weeks later there was no reaction about the arm. Healing progressed favorably with the very little discharge. Motion in elbow was not increased. The lower wound healed *per primam*. Eight weeks after operation he was discharged from the hospital with the wounds almost healed. He was using his arm for light lifting with good motion at the shoulder but the elbow has remained stiff. We expect to do an arthroplasty later.

There have been three cases with involvement of the upper end of the femur in which the infection attacked the hip-joint and the head of the bone had to be removed. It has been our practice after the healing of the shaft has progressed far enough to give a solid end to insert this into the acetabulum and hold the leg in abduction to overcome the shortening. Two of these cases have healed long enough to insure satisfactory end results (see also case 11 page 20). The notes on the following case are given because of the unusual finding at operation and the rather early healing of the bone lesion.

CASE 31 Children's Hospital No. 6,260 J B, age 10 osteomyelitis of left femur at hip and proximal

The child was admitted January 8, 1914 with a history of a fall on the buttocks five weeks before when a chair had been pulled from under her. For a week she was up and about and did not complain. Then the hip and thigh became tender and swollen. She could not use the leg and she was sick. She lay in bed with thigh slightly flexed and rotated inward, with two inches apparent shortening. There was fluctuation over upper part of the thigh and hip. The X-ray showed the head out of the acetabulum. The upper part of the femur and neck had a worm-eaten appearance. Under either the abscess was opened and the head and neck of the femur were found free in the abscess cavity and were removed. Extension was applied. Cultures gave staphylococcus. Her condition improved directly. There was still a sinus at the end of a month but the bone

appeared in good shape on the X-ray plate. Several attempts were made to put the leg in abduction in a spica, but each time the infection appeared and the discharge became profuse. However on June 16, 1914, six months after the first operation she was given nutritious food and the oil sinus opened widely and the acetabulum cleaned of tough fibrous tissue. The end of the femur inserted into the socket and held in marked abduction with a plaster spica. There was considerable pain for four days and the temperature remained up. It then receded and the child left the hospital at the end of a month practically healed with the leg in abduction. She has done well since. This child had a psychosis that showed at the end of the second month and lasted for a month. The tuberculin skin reaction was positive but we were unable to locate the tubercular lesion.

When the infection has attacked either one of the two bones of the forearm or leg and the other can be relied upon as a splint during the healing the treatment after the primary drainage has been to excise the diseased part of the shaft as soon as the periosteal reaction is evident. This method has more recently been popularized by Nichols, who called attention to the suggestion made by Olier many years before that the infected shaft be removed and new bone be developed from the periosteum to replace it. In this way the infectious nidus is removed early, the consequences of a protracted septic intoxication avoided and the nidus is replaced by new bone which is without infection and in which there are no sequestra to produce sinuses. An important point to determine is the proper time to remove the infected shaft and of equal importance is to remove only the shaft and leave all the periosteum and such new formed bone elements as lie beneath it. Nichols suggested that the shaft be removed when by needling the periosteum it is possible to detect little bone spicules by their grating and we have found that the shadow cast by the thickened periosteum makes an equally certain guide. It has usually been found that the shaft is ready for operation about six weeks after the infection begins but there is a variation either way from one week less to one or two weeks more. The involved shaft is in this way entirely removed or at least to the extent of its involvement and the tube of periosteum is sutured with fine catgut into a ribbon which joins the healthy parts of the

shaft that remain. The wound is closed completely and incased in a plaster cast. At times the healing will be almost by primary union and after observing the wound through a window in the cast for a few weeks it can be put into a permanent cast to await the development of new bone. New bone is first shown on the X-ray plates in from four to six weeks and at the end of a few months the lower limb can be used for weight bearing with the precaution of a proper support.

In seven instances we have had perfect replacement of the removed shaft without a sinus (Cases 1, 2, 11, 16, 22, 23 and 30) and their period of disability was very much shorter than it would have been if treated by other methods. In some of these cases only the tibia was involved. One case (22) had the humerus alone involved and the result in this case was so excellent that not only was healing very much more rapid but despite the fact that there was no accompanying bone to splint the part the arm healed in excellent position and with no shortening. It therefore appears to us as good practice to treat all humerus infections by removing the shaft if they come under observation early in the illness before a sequestrum is formed or the periosteal new bone is too thickly developed. Three of the cases had more than one bone involved and the healing in the parts where the shaft has been removed has been many months earlier than in the parts where we had to wait for new bone to regenerate from the bone partially destroyed by infection and operation. Brief abstracts of some of the histories of the cases in this group are given.

CASE 1. St. Louis Mullanphy Hospital No. 945 H II. Age 6 osteomyelitis of tibia (Fig. 2). The child was admitted to this hospital August 22, 1913 with a history of a sudden illness beginning 10 months before with high fever, delirium and great pain in the left leg. The leg swelled rapidly. The fever continued for 10 days when fluctuation was made out below the upper third of the tibia and was incised. The abscess was drained and the X-ray showed no oil in the soft parts of the tibia with no ill sequestrum. The abscess was thickened with pus. A phylococcus. On September 1, 1913 the upper third of the tibia was removed. The periosteum was stripped off the shaft and the shaft drilled to the junction of the

middle and upper third This end was lifted up and divided from the upper epiphysis The periosteum which was thickened was sutured with catgut so that the lateral walls made a ribbon connecting the upper epiphysis with the lower fragment Where the periosteum formed a pocket above and below iodoform wax was poured in (These are the only two cases in which we used wax and we do not believe it offers any advantage) The wound of the skin and soft parts was closed and the leg enclosed in a cast The wound was dressed on the tenth day and found to be without discharge and closely healed He left the hospital at the end of five weeks and new bone showed then on X ray examination He returned from time to time for examination and the progress of the new bone formation is shown on the X ray plates taken at such times He was excessively active and on this account a splint was provided and he was kept from walking without support until nine months had passed There has been no trouble of any kind with the leg and the new bone is now to all appearances just the same as its fellow (F G 3)

CASE 23 Children's Hospital No 6674 E G age 11 osteomyelitis of left radius right femur and right tibia

Before admission to the hospital on April 11 1914 the child had been operated on twice The illness has dated back five weeks with high fever and great prostration The left forearm was first attacked followed shortly by pain in the left leg The abscess that formed at the wrist broke and the leg was incised After four weeks he was taken to a hospital where operations were performed on the tibia femur and radius An X ray picture taken on admission showed the lower third of the radius destroyed but with active periosteal regeneration The tibia showed involvement of the upper half which remained as a shell the medulla having evidently been curetted away The lower third of the femur was honeycombed and the seat of a fracture The radial and tibia wounds had been packed with iodoform gauze damming back the pus Two days after admission the boy was operated under ether Several loose sequestra were removed from the femur and the cavity drained The tibia was opened by making a channel extending below the original opening This new incision was drained with rubber tissue but that part of the bone which had been vigorously curetted at a previous operation was filled with bone wax The radius was reopened and drained and a small sequestrum removed In two weeks the discharge had decreased markedly The left rib gave us the most concern because of the deformity developing which was like that of a Colles fracture The epiphyseal line seemed destroyed and the lower epiphysis slipped backward with the arm more or less fixed in the pronated position with the hand drawn to the radial side To correct this deformity if possible and to get rid of the infected material an operation was done on the radius on May 23 removing three pieces of the shaft from the lower part and bringing the periosteum

together This was rather difficult as the new bone developing under the periosteum was well organized The bone after being carefully stripped of this was divided about the middle and lifted out at the epiphyseal line last From the smooth granulating appearance of the inner side of the epiphyseal line we judge that at least that part was destroyed although the ulnar part of the line appeared to be still active The arm was molded almost straight In three weeks discharge at the wrist had ceased and an X ray after two months showed new bone almost of the size of the original shaft There is still some deformity The femur continued to discharge for some time and at the end of three months (July 10 1914) two small sequestra were removed the granulation wiped out and the cavity filled with iodoform wax The tibia had been curetted before we saw the boy and was filled with iodoform wax The cavity has gradually filled up the wax had not been removed as it had been forced forward as the cavity grew less This plan was chosen because it was the most favorable instance to observe the healing in the old practice of cleaning out an infected bone and letting it fill up The small uncovered wound remains while the arm which was treated by our custom of excising the shaft is well and useful But although the wound of the tibia has almost healed there is still a large cavity in the bone and the leg is not going to develop any more new bone to judge from the similarity of the shadows on successive X ray plates Another unfortunate condition is the laxity of the knee joint On admission the knee joint was swollen in fact the whole limb was much enlarged The knee would recede at first under bandaging and then it would swell with elevation of temperature and become quite painful and hot These changes were quite independent as far as we could see of the condition of the femur or tibia Aspiration of the distended joint on no occasion has given positive cultures but frequently the fluid has been turbid and contained pus cells For the past month the joint has been better than before The cultures from the bone abscess are staphylococcus The Wassermann and tuberculin reactions have been negative

CASE 16 Children's Hospital No 5093 M P age 9 osteomyelitis of left tibia and right femur

The boy was admitted October 16 1913 Five days before he had injured the ankle but had not broken the skin There had been an open sore on the heel two weeks before but it had healed The day after injuring the ankle he had fever and vomited and had some pain in the leg and swelling about the foot and the ankle and lower leg were red and swollen due to a cellulitis but there was only a suggestive suggestion of an incision gave no pus The next day the inflammation was more extensive and a few blisters were over the whole inflamed area The X ray pictures show no change in the bone structure above the right knee the femur had become tender but this showed no change in the X ray plates Blood-cultures showed staphylococcus.

months after the operation a sinus still persisted at the hip and an X ray picture showed the head forced out of the joint and lying free in a cavity below the bridge of bone representing the new neck. The head was removed in January 1913 by enlarging the sinus and lifting it out with the finger as it was loose. The acetabulum was filled with granulations which were wiped out. A part of the cavity was occupied by the new neck which seemed firmly anchored. A small drain of iodoform beeswax mixture was poured into the sinus. This drained some for a time. The wax was gradually extruded and now the leg is healed. The result with the tibia has been excellent. After the shaft was removed new bone showed to be developing at the end of six weeks and this continued to enlarge until it became as strong as its fellow. The shadows cast by the replacing bone were much less dense than in the other new bones in our series. This we believed was due to the lack of use of the limb because of the trouble at the hip. The foot bones which were not diseased gave a correspondingly light picture such as is seen in the atrophy of disuse. The wound of the tibia healed very rapidly and was closed in three weeks after the shaft was removed. During the child's first stay in the hospital the urine contained much pus which improved under copious water drinking and changing the acid to an alkaline reaction. On her return home she had several attacks of renal colic and later Dr. Nowlin found several small calculi which she passed. A picture of the kidney region showed several calculi in the renal pelvis which were removed under gas anesthesia January 1, 1914. The child has remained free from pain since and her urine without pus.

There have been three cases in which there has been a partial failure of regeneration of bone in the periosteal tube left after excision of the shaft and in these cases we have subsequently made a transplant of bone with most satisfactory results (Case 3, 4 and 10). Other operators have had similar failures and various explanations have been offered for this outcome but the explanation that comes to mind when reading a report of such a failure is that the periosteum was removed with the shaft. In these three cases I am certain that this is not the explanation as I have been most careful at the operations to keep within the periosteum as since the failure to regenerate I have studied the bone specimens that were removed and find no periosteum attached to them. The age factor does not enter as the oldest was thirteen the other two being seven and ten respectively and we have had perfect replacement in children of these various ages. The one factor

that seems constant is that of protracted infection in the periosteal tube. Case 3 is a brother of Case 2. The disease developed simultaneously each in the upper end of the tibia and the amount of bone destruction in both tibias was apparently the same and the amount of new bone formation seemed the same on the X ray plates. They were operated the same day. The conditions found at operation were the same and both cases were handled alike except that about two inches more of the tibia had to be removed in Case 3. Case 2 healed *per primam* while this case suppurated slightly and discharged for a time rather profusely but this had about ceased in six weeks and there was only a small sinus in the upper end of the wound which persisted for two months. There was a thin pencil of bone developed in the periosteum extending from the lower fragment upward about three and one half inches but at the upper end of the wound only a little new bone had formed below the epiphysis. It left a gap without bone which corresponded to the place where the sinus had persisted. In Case 4 the child had been sick for three months when admitted. The X ray showed a periosteal shadow about one quarter of an inch in thickness and a sequestrum of the upper two-thirds of the shaft of the tibia. When operating we found a moderately thickened periosteum with minute bone flakes but scattered under the periosteum between it and the sequestered shaft were many small abscesses. The periosteum was molded into a ribbon and sutured with chromic catgut. The whole length of the wound continued to suppurate and at the end of two and a half months a piece of the chromic catgut was taken from the wound. After that the healing progressed but a sinus persisted and occasionally the whole upper part of the leg would swell as long as six months after the operation. In the upper part of the defect new bone showed at the end of three months about two and a quarter inches long and at the end of eight months this had not changed any in size so that a transplant of four and one half inches of bone from the front of the opposite tibia was made with perfect healing. Four and a half months

after this transplant was inserted she was walking on the leg (nineteen months after the first operation) Case 10 came to the hospital after a two weeks illness Since the second day an abscess over the tibia had been present with a small stab wound drainage which had allowed the pus to burrow under the periosteum from the ankle to the tibial tubercle When an incision was made exposing the bone the shaft was found denuded of all periosteum This together with the infection inside the shaft had cut off the blood supply and the shaft was necrotic for its lower two thirds After the pus was let out the periosteum was allowed to drop back on the shaft in the hope that new bone might develop in it or that it might again become adherent to the shaft Adequate drainage was secured with gutta-percha tissue outside the shaft and where the medullary canal was opened Careful examination with the X ray showed some periosteal activity after ten weeks and the shaft was removed and the periosteum treated as advised by Nichols this time using number two plain catgut because of one experience with chromic gut in Case 3 There was an abscess behind the shaft about its middle but except for this the wound was fairly clean The most active periosteum at the time of operation was in the lower part of the wound but the only place where new bone developed was in the center of the defect There was a fairly active discharge for many months One year after the first operation a bone transplant was made This healed perfectly and at the end of five months the boy was walking on the limb

The only explanation I can offer for these failures lies in the presence of long continued suppuration in the periosteal tube after the shaft has been removed and that this suppuration has destroyed the bone-forming elements Nichols makes slight mention as far as I can find of a failure of the periosteum to develop new bone Homans mentions one case of incomplete bone regeneration in a case operated by resecting the tibia six days after the acute onset which later required a transplantation of the fibula and another case of partial regeneration in a fibula which was operated according to Nichols dictum seven weeks

after onset Stone recounts a failure of regeneration of the tibia and Huntington does also I know that other operators have not uniformly had complete regeneration of bone after subperiosteal resection As the literature now begins to show the new method of bone transplantation we see reports where this was done in cases of osteomyelitis where the shaft was removed and not reformed The theory of Macewen that periosteum is only a limiting membrane and has no osteogenic power and that all diaphyseal bone is reproduced by the proliferation of osteoblasts derived from preexisting osseous tissue has been accepted by some though we are inclined to reject the first part of this contention and to attribute to the periosteum an active function in the bone production If however we do accept this theory we can explain the failure to complete regeneration in my cases by considering the suppuration after the operation as destructive of the small bone-plates that have been left attached to the periosteum thus leaving in the center of the periosteal tube no osteoblasts from preexisting osseous tissue The new bone developing at the ends of the defect may be explained as arising either from periosteal plates that escaped destruction from infection or as possibly growing from the proliferation of bone-cells derived from the epiphyseal line at one end and the cut end of the shaft at the other

I will not go into a discussion of the nature of the healing and regeneration of new bone from bone transplants In these and other cases we have made use of bone from the same individual taken from the tibia leaving the periosteum on the transplant Following the course of the cases after transplanting bone by X ray pictures taken at regular intervals we notice that the bone in a few months has lost in density of shadow and later the shadow is deeper as the bone begins to conform to the size and shape of the shaft which it replaces An examination of the plates in the cases of transplanted bone shows that there is little evidence of any activity beneath the periosteum but the shadow which represents the growth of the new bone is from the marrow side of the graft In Case 3 the

graft after five months had undergone a partial absorption and at one point it appears to be broken with rather wide intervals between the ends. There was no break and the spicule of bone in front of the graft is solid. At the point where the bone appears fractured the graft was cut thin and had no endosteum left. This part of the graft has clearly not been the skeleton on which new bone has formed because there is later a bulging of the shadow like the callus about a break. An interesting point is the increased activity of the narrow piece of bone which had developed in the periosteum after the transplant was laid next to it. It had practically stopped enlarging when the grafting operation was done.

CASE 3 St. Louis Mullanphy Hospital No. 9404
C. H. age 10, osteomyelitis of right tibia (Fig. 4)

The boy, a brother of Case 2, was admitted to the hospital August 22, 1911, with a history of illness beginning two months before when the right leg just below the knee became painfully tender and swollen. There had been no injury but there was inability to use the limb because of the pain which was constant and severe. Three days later a swelling below the knee was lanced with relief of pain. There was a sinus discharging pus and the upper half of the tibia was thickened. The X-ray picture showed a destruction of the upper five inches of the shaft with a periosteal thickening. Cultures gave a staphylococcus. On September 1, 1911, he was operated and about five and a half inches of a soft and necrotic shaft was removed leaving the thickened periosteum which was sutured with a fine catgut to make a ribbon. The skin was closed with catgut. On the fifth day a window was cut in the plaster cast and the wound dressed. There was a rather free discharge from the wound. An X-ray showed no evidence of new bone formation. On December 20, 1911, four months after operation, he was admitted to the Children's Hospital with a sinus persisting at the upper end of the wound with a rigidity of the tibia throughout part of the defect but no evidence of bone in the upper part of the wound where there was motion when the leg was swung laterally. An X-ray picture showed a thin process of bone not more than an eighth of an inch in diameter extending upward four inches from the lower end of the tibia and leaving a gap of two inches just below the epiphysis where there was no new bone. This hiatus corresponded to the part of long continued suppuration. Four months later he returned for observation with the sinus healed and an X-ray showed the condition practically unchanged since the previous visit except that the thin process of bone had thickened to about one-quarter inch in diameter but it was no longer. The epiphysis was tilting forward

which made the gap appear slightly less than before. He was readmitted to the Children's Hospital where he was operated and bone grafted in the defect. June 18, 1912, nine and a half months after excision of the shaft with a Gigli saw a piece of bone was removed from the crest of the opposite tibia five and one half inches long about one quarter inch thick and one inch wide leaving the periosteum intact. An incision was made beside the long spicule of bone a mortise made in the under surface of the epiphysis and a small ledge cut into the end of the lower fragment. The bone graft was forced into the interval and needed no fixation sutures to hold it in place. The periosteum was turned backward and the wounds were closed. Healing was *per primam* throughout. He left the hospital in six weeks. Up to three months after this operation we thought we could make out slight lateral motion at the joining of the upper end of the graft to the epiphysis but this was very slight and in four and a half months he was using his leg without support. On January 1, 1913, he was admitted with a fracture of the right tibia. The break was not through the part where the graft was removed but a half inch above the upper part of the channel. A study of the X-ray plates showing the development of the graft is of interest. These were taken every two or three months. Six weeks after the operation we note that that part of the graft above the lower end where our saw had cut the bone very thin produces a shadow which is continuous but almost transparent. In five months there appeared to be a fracture at this point but it is in reality a complete absorption of the bone salts because the spicule of bone that lay in front of the transplant is continuous in fact has increased greatly in size. Furthermore the leg is now being used for weight-bearing and is perfectly rigid. At the end of eight months the gap still shows but is almost obliterated and from now on up to the end of fourteen months there has developed in the gap what might have been termed a callus had there been a break. This bulge is on the periosteal side of the transplant and this extra building of bone may be considered as due to periosteal activity. The absorption may be accounted for by the fact that at this part of the graft there was only hard cortical bone without medullary cells while the rest of the graft had medulla attached. If the graft is regarded as acting as a scaffold for the development of new bone then we find the marrow cells the most vigorous parents in the early stages the periosteum showing its activity later. This speculation is aside from the issue. The graft developed so rapidly that in less than a year there was new bone equal in size to the rest of the shaft and subsequently the cells rearranged themselves to give the impression upon studying the plate that a new cortical tube developed with a narrow cavity.

CASE 4 Children's Hospital No. 2184 C. L. age 13, osteomyelitis of tibia (Fig. 5)

On October 18, 1911, when she was admitted to the hospital there was a swelling of the lower leg

which had existed for three months. It had been opened two weeks after the onset and had continued discharging pus ever since. On October 30, 1911, he was under two-thirds of the shaft was excised. The shaft was sequestered and contained many small abscesses. The bone was almost entirely separated at the upper epiphyseal line. The periosteum which was quite thick was carefully preserved in its situation with chromo-cautery and the skin was partially closed. A plaster cast was applied. After admission to the hospital, but there was a moderate discharge throughout the length of the wound. At the end of two and a half months the discharge still continued. At this time a large piece of unabsorbed chromo-cautery was removed from the wound. There was no evidence of new bone formation or of the risk of graft. At the end of six months the infection had subsided except for two small abscesses. The X-ray picture shows these to be due to small sequestra. The new bone formation is thickened only at the upper end of the wound below the epiphysis. In a sixth month the wound was healed but the leg remained weak. Four months after the operation the new bone formed; the periosteum is represented by a spicule two inches long extending downwards and forwards from the epiphysis and a triangular zone of new bone formation. On the medial side of the operation was performed. The wound was closed. The length of the original shaft of the tibia. The fragment of new bone was left with bone cutting forceps and bent backward to be in line with the transplant. A cast was made in the epiphysis received the upper end of the transplant and a small cavity in the end of the lower fragment of the tibia. A transplant of the new bone half inches long was taken from the crest of the scapula and sutured with the periosteum attached. The wound was closed with a shape of gauze one half inch from the crest of the bone and lifting the graft with a double edge forceps after either end had been marked with. The graft was inserted in the prepared site and the wound closed. The graft healed in perfectly and without reaction. After the first four days she was walking about the ward and four months after the operation was using the graft leg with the support of a light brace. The bone developed from this transplant at the end of a year was the same size as the rest of the shaft and the leg gives the appearance of never having been diseased.

SUMMARY

Diagnosis. The earliest symptom of osteomyelitis is pain in the shaft of the long bone (usually near the end) accompanying septic symptoms. In a few cases of profound septic pain sense is lost. Soon there is swelling of the shaft near the joint frequently at the epiphyseal line. At this stage the joint is not involved. Septic arthritis usually is an intense infection with less pain and several joints

involved. Tuberculosis is a chronic disease that involves the epiphysis and syphilis may give a similar picture. The X-ray of great value except at onset of the infection.

Treatment. The treatment in the acute stage is to drain to the center of the medulla by removing a narrow channel of bone along one side of the shaft (cutta perchi) is useful to drain this channel. The medulla should never be cleaned out as it is needed for the endosteal regeneration.

In the case of chronic stage of osteomyelitis of the femur or humerus treatment is planned to allow the shaft to heal after efficient and sufficient drainage. If sequestra have formed these are removed and the cavity wiped out with gauze. It is best not to irritate these cavities by attempting to sterilize with antiseptics. The Moseley method of Moseley, Moorehead, introduced into the cavity to act as a drain which is partially absorbed and partially extruded. Gauze should never be used as a drain in either the acute or chronic stage. Where the bone of the forearm or leg is involved (and at times the humerus) the treatment suggested by Moseley is followed. The shaft is removed subperiosteally about five or six weeks after draining the acute infection. The periosteum at this time should show a sufficient thickness to carry a hindrance on the X-ray plate. After removing the shaft the periosteum is sutured into a ribbed joining, the end of the remaining bone and from this periosteum new bone is formed to replace the diseased shaft. In the meantime the other bone supports the limb in its proper position. In about four months the new bone can support weight. The forearm can be useful in less time.

In a small proportion of badly infected cases bone does not regenerate completely after removal of the shaft and bone transplantation has to be resorted to after healing is obtained.

Chronic localized osteomyelitis (civitis) in the cancellous bone may be treated by healing under blood clot or drainage with Moseley-Moorhead way after the bone detritus has been removed with rongeur and gauze.

NOTE.—Osteitis is the inflammation of bone. It is a localized inflammation of the bone.

PYLORECTOMY AND PARTIAL GASTRECTOMY OR EXCISION OF THE ULCER BEARING AREA IN THE TREATMENT OF GASTRIC ULCER¹

By WILLIAM L. RODMAN, M.D., LL.D., F.A.C.S., PHILADELPHIA

FOURTEEN years ago in a paper before the American Surgical Association I advocated a more radical treatment of gastric ulcer than had been hitherto practiced. I was led to do so not from theoretic considerations alone but after a careful study of the few cases published and others reported to me in an extensive correspondence with American and foreign surgeons giving the clinical result following partial gastrectomy and pylorotomy. Nearly all of the forty patients so treated had been operated upon with the belief that they were suffering from cancer and hence demanded more radical measures than pyloroplasty and gastro-enterostomy then so much in vogue in the surgical treatment of ulcer. It was also ascertained not only that the more formidable procedures of partial gastrectomy and pylorotomy had been followed by far better clinical results but that the operative mortality was little if any more (15 per cent) than the acknowledged risk inherent to pyloroplasty and gastro-enterostomy at that time. Nevertheless I felt that partial gastrectomy and pylorotomy especially the latter might yield a heavier mortality than either pyloroplasty or gastro-enterostomy and that the favorable showing then made for the more radical measures was perhaps fortuitous or due to the fact that the surgeon was more ready to report successful instances of a new operation than unsuccessful ones. But this much was reasonably certain: radical treatment or excision of gastric ulcers did prevent subsequent hemorrhage, perforation, subphrenic abscess, hour glass stomach and malignant degeneration while neither pyloroplasty nor gastro-enterostomy as usually practiced prevented any of them. Therefore an operation which gave assurance against such future disasters and which moreover left the stomach in a much better condition for the performance of its normal functions had

a claim for consideration even though its mortality were far greater than the uncertain and oftentimes at most palliative procedures. It was later made apparent that pyloroplasty gave such unsatisfactory results operative and clinical that it fell into general disfavor and has hardly been heard of in the past ten years. I refer of course to the Heineke-Mikulicz operation which was so generally practiced between 1895 and 1905. The operation of Finney however introduced in 1902 and based upon sounder physiological, pathological and surgical grounds has not only maintained its place but has grown in favor and seems particularly applicable in the treatment of duodenal ulcers.

That gastro-enterostomy was not for many years at least followed by the best operative and clinical results is only too clearly evidenced by the many changes made necessary in its technique. They are too numerous to mention. The most that can be said at this time is that surgeons very generally prefer the posterior to the anterior anastomosis and that the long loop of twelve or more inches has been gradually shortened on account of regurgitant vomiting until there is usually no loop at all. Mechanical devices have been abandoned for direct suture but the method of approximating the stomach and jejunum, the length of the opening between them and the many nicer points of detail vary widely with different operators.

Every one from the time gastro-enterostomy was first practiced has been made to observe that patients with a closed or partially closed pylorus do better than those in whom it has been left patent and yet notwithstanding the many operative procedures to secure pyloric exclusion none of them has yielded entirely satisfactory results. A majority of the one hundred surgeons communicated with and expressing themselves upon this point withhold their approval of the prin-

ciple others speak pessimistically of the clinical results in the cases which they have observed while still others commend the principle but do not believe that a satisfactory method has yet been discovered.

After carefully reviewing the statistics recently furnished me I am impressed with three things. First that the operative mortality following gastroenterotomy has not been less than 5 per cent. second that the end results are frequently disappointing to the surgeon and disastrous to the patient making his second estate worse than his first. Third that a number of perfectly satisfactory gastrojejunostomies from an operative point of view the patients remaining well for a year or longer after operation were followed by malignant disease and death. As one of the members of this Association expressed it "Two thirds of the patients who survive the operation are cured one sixth are bittered while the remaining one sixth are rank failures no better perhaps worse than before operation." Some of the supposed ulcers may have already undergone cancerization before the gastroenterotomy but in others the evidence of malignancy was postponed several years. This factor was emphatically brought out in the reports of Gerster Mayo Lienthal Robson and many others.

Gerster writes me as follows: "Gastroenterostomy in ulcers yielded to me on the whole good results—very good operative results but there were a number of clinical failures due to the development of cancer in the ulcers. Resection of the ulcer bearing area is the ideal method of treatment and should be applied wherever topographic and technical considerations do not forbid."

Dr. Lienthal writes: "Gastroenterotomy in its various forms does not give me satisfaction and in three cases which I happen to remember just now carcinoma developed at the pylorus years after the gastroenterotomy in two cases the stomach closed. I do not approve of the various exclusion methods and can prove by X-ray studies that in many of these cases patency is re-established."

William J. Mayo our distinguished president wrote me as follows in 1908: "The

main field for the Rodman operation as we find it is an inability at the operating table to tell a carcinoma from an ulcer. In three cases out of four when we remove a suspicious ulcer it proves to be a carcinoma and a number of cases after gastric enterostomy for supposed ulcer have developed carcinoma so quickly as to make it almost certain that it had existed at the time of operation. Only a few days since I sent him the above quotation from his former letter asking him to use it again or if he wished to revise it so as to make it conform to his present views and practice. He replied that he had no change to make as it was just as true today as when it was written."

Have we not in the above expressed views and practice the only explanation of the remarkable results achieved at the Rochester clinic in both ulcer and carcinoma of the stomach? At no other clinic in the world have their results been approached in the treatment of the latter affection showing 25 per cent of five year cures and 36 plus per cent of three year cures. Such results would not be possible if only lesions microscopically cancerous were considered.

On account of the number of carcinomata following gastric ulcers in his practice (59.3 per cent) May Robson one of the earliest and ablest exponents of gastric surgery said in 1904 that "excision of the ulcer bearing area must be more frequently done in the future." Furthermore of 112 posterior gastroenterostomies performed by Mayo Robson for ulcer four patients died subsequently of carcinoma. It developed in one patient at the end of a year after a perfectly successful gastroenterostomy in one after two and one fourth years in another after two and one half years and in the fourth after three and one half years. All enjoyed good health between the gastroenterostomy and the onset of cancer symptoms. The time intervening renders it unlikely that a mistake in diagnosis could have been made in any but the first case. There are other cases in this series where it seems more than probable that death was due to cancer.

Bevan of Chicago informs me that he has performed about a dozen pylorotomies for

ulcer where a laparotomy diagnosis of probable carcinoma was made although all the patients recovered he believes the more radical procedure should be reserved for the worst cases and then perhaps performed in two stages. He has found gastro enterotomy on the whole satisfactory in the treatment of gastric and duodenal ulcers but has excised both with good results.

The following communication was received from George Emerson Brewer. In reply to your note I can say that I have never done a pylorectomy for benign ulcer. I thoroughly approve of your suggestion and teach it. I have a number of times done a pylorectomy for an induration following an ulcer history but in every instance the growth was found to be malignant. In only one instance have I removed a large saddle ulcer of the lesser curvature. This case gave us a very satisfactory result. During the past six weeks I have had two cases in which I expected to do an excision thinking the growth was benign. In one instance it was inoperable and found to be syphilitic and in the other carcinoma.

R C Coffey of Portland who has done much operative and experimental work in the upper abdomen says. Concerning gastric ulcers I will state that I am doing the Rodman operation more frequently all the time. I have done two within the past month. I believe I have done something like ten previous operations making twelve with one death. I have now reached the rather definite conclusion that when a patient is in good condition and the ulcer is near the pylorus either in the duodenum or stomach and has not perforated or adhered to the head of the pancreas I do pylorectomy. If there has been a duodenal perforation and the duodenum has adhered to the head of the pancreas I do von Eiselsberg's unilateral excision. I think McCarthy's recent paper in the February *Archives of Internal Medicine* is more convincing still that we should remove an ulcer when possible.

There are many others from whom I could quote all to the same effect. We have shown I think that even the most experienced surgeons cannot make an accurate

diagnosis in chronic gastric lesions. That this difficulty will assuredly be increased in hosts who have reached or passed middle age the time when both ulcer and cancer are most common cannot be questioned. Is it not, therefore true conservatism to take into consideration potential dangers such as hæmorrhage perforation subphrenic abscess disabling adhesions and greatest of all cancerous implantation upon the base of the ulcer and to anticipate and prevent all by a radical operation instead of doing one which may at most prove palliative and that for a time only? The only way to view this difficulty it seems to me is to ascertain if a radical operation which removes the lesion can be instituted with less risk to the patient than that which is inseparable from the disease itself. In chronic ulcers there would seem to be no difficulty in answering this question as a conservative estimate of the mortality following medical treatment and admitted by medical authorities is not less than 25 per cent. If we separate excisions and pylorectomies we find that the former yield a mortality of 1.75 per cent (171 operations 3 deaths) which is less than that following gastro enterostomy. Two hundred and five pylorectomies were followed by 18 deaths or 8.7 per cent. It must be remembered that these statistics include all operations reported during the past fifteen years and represent the experience of many surgeons some of whom have done very few operations. In 376 radical operations performed by all of the surgeons communicated with the mortality was 5.6 per cent or less than that from hæmorrhage alone and one half that following perforation not to mention the additional risks of subphrenic abscess disabling adhesions resulting in hour glass stomach and that indefinite intangible but ever increasing danger malignant degeneration of the ulcer. So frequent is the last mentioned complication that it would seem now the duty of the surgeon to remove the lesion when it is practicable and does not entail too great operative risk for a considerable majority of those communicated with have expressed themselves most positively upon this point.

Furthermore we should realize that the

most recent and trustworthy statistics show that there are 75,000 deaths from cancer in the United States annually—that 35 per cent or more than 26,000 are caused by carcinoma of the stomach (Virchow) and moreover that those surgeons most experienced in gastric surgery have reported after accurate clinical and microscopical observations made at their respective clinics that a percentage varying from 50 (Mayo Robson) to 71 per cent (W. J. and C. H. Mayo) of gastric carcinomata are preceded by ulcer.

Sir Berkeley Moynihan who was my guest in 1903 did not hesitate to tell me plainly a trait so characteristic and admirable in the English that I greatly overestimated the frequency of carcinomatous change in gastric ulcers had so changed his view within the next five years as to publish in 1908 that 72.1 per cent of the operations he had recently done for gastric cancer had been preceded by a well marked history of ulcer varying from 3 to 26 years. The observation of Moynihan and Mayo-Robson a true clinician as they are are entitled to much weight though unsupported by microscopical examination.

No one who has visited the clinic at Rochester a privilege I have many times enjoyed during the past fifteen years has left there without being impressed with one fact that pathology is used as it should be as the true handmaiden to surgery. Every tumor or lesion removed is at once examined by competent microscopists and an immediate report made to the operator and onlookers. Moreover the frozen section report are later confirmed by serial sections. In this way and in this way only in my opinion will the patient get that to which he is entitled. The time for guessing has passed as we have already shown that the most experienced men confess their inability to make an accurate diagnosis even when the lesion is inspected palpated and scrutinized from every viewpoint. The presence of enlarged lymphatic glands does not necessarily mean cancer as they may be inflammatory and the absence of such involvement most certainly cannot rightly be construed as always or usually indicating a benign process and to

await positive evidence of cancer to allow the precious time for surgery to pass. The microscope and it only can tell what pathological changes have occurred and the patient has a right to insist that his surgeon avail himself of every means at his command to obtain accurate information at the time of operation so that the right procedure can be instituted and that he as well as others may profit thereby. That to many patients with potential or actual cancerous lesions in the stomach breast gall bladder intestines prostate and other organs pay the price of involuntary sacrifice to incomplete surgery cannot be questioned.

It would seem clear that more radical measures than hitherto usually practiced should be employed as that cancer in its early stage may be cured. I latter present it altogether. Never at any time in the world history has the cancer menace been so generally appreciated as now. Never has there been such intelligent cooperation between the medical profession philanthropist and the laity to discover its cause and never certainly have urges been so stimulated and quickened to act promptly themselves and to urge medical confreres to do likewise in combating this scourge. But recognizing as all do the strictly local nature of carcinoma primarily and as well the deirability of acting during the precancerous stage when considering the breast lip tongue gall bladder intestine prostate etc. there has not seemed to be as keen nor so general an appreciation of the frequency of gastric cancer nor of its close association with ulcer as an etiologic factor. And yet both facts have been proclaimed from the very house-top by clinician and pathologist. We have already mentioned the former and it is only necessary to refer to the work of Cruveilhier (1839) Dittich (1848) Rokitan (1849) Huser (1903) Lutterer (1892) Sapezhko (1902) Stich (1901) Oettinger (1903) Jeddlicka (1904) and a host of others such as Zenker Klaus Sonnenchen and Schmincke to show that a percentage of gastric carcinomata varying from 26.6 (Jeddlicka) to 90 per cent (Sapezhko) give positive microscopical evidence of having been preceded by ulcer. One

of the number (Jeddlicka) also made clear from pathological investigation in 1904 what I had believed in 1900 from the scant clinical evidence then forthcoming that gastric ulcers in other parts of the organ than the pylorus and its proximity do not undergo cancerization. He says: "It should be noted that all the ulcer carcinomas were encountered in the pylorus whereas ulcers situated in other portions of the stomach and which were examined did not reveal a single carcinoma." In 1905 I encountered one patient with ulcer carcinoma in the middle of the stomach and found a similar case reported by Cackovic. Both have been reported and others have doubtless occurred. It is however reasonably certain that ulcers in the larger and more expanded four fifths of the stomach are not only very much less frequent comprising as they do only 20 per cent of the total number of gastric ulcers but rarely undergo malignant change. Eighty per cent of all ulcers are found in the pyloric fifth. The greater irritation to which ulcers at the pylorus or in the pyloric antrum are subjected and the forcible impact of the large amount of acid chyme upon them during digestion would seem to furnish adequate reason why they are so prone to undergo cancerization. They too are more likely to be followed by perforation and hemorrhage and when the latter occurs on account of the large vessels in this situation it is apt to be severe. Therefore a more radical treatment of such ulcers is called for and pylorotomy which removes largely the ulcer bearing area is the operation of choice provided that the pyloric end of the stomach can be easily mobilized and the patient is in good condition.

It is questionable if it should be done in the presence of acute perforation or severe hemorrhage. Many of the fatalities reported have been due to too radical surgery in spite of these grave complications. I have only once undertaken pylorotomy for a large acute perforation on the anterior wall of the pylorus which occurred just after a hearty luncheon. The escape of gastric contents was marked as the opening was large and ragged. My patient was a robust young man of twenty two and as the sutures would not

hold because of the necrotic tissue around the perforation resection of the pyloric end of the stomach supplemented with a posterior gastrojejunostomy was done as a *dernier ressort*. I have never had a patient do better in every way even after simple gastroenterostomy. I have also performed pylorotomy after there had been moderate chronic hemorrhages but I should hesitate to do so in the presence of even moderate acute hemorrhage and would not do so at all during a severe hemorrhage or the ensuing shock. In such circumstances I have for the past twelve years depended upon morphia and atropia hypodermatically and very hot water 130 cautiously introduced through a tube.

I was led to do this first in 1902 after the most severe and repeated gastrorrhagias I had ever witnessed. The patient was pulseless, delirious and exsanguinated to such a degree that recovery seemed impossible. I did not believe a human being could lose so much blood and live. The room in which she lay resembled an *abattoir*. The night superintendent the nurses and my assistant were covered with blood when I arrived. Before I came my assistant Dr S C Burns had given morphia, ice and astringents of every description without result. In my desperation eight ounces of hot water was introduced through a stomach tube. We both remained in the hospital all night and one of us was constantly on watch. The vomiting and bleeding were immediately checked by the hot water. It has never failed me and I have used it in about 20 cases. Dr W H Thomas one of my assistants has had a similar experience and has recently reported his cases.

Within a fortnight I saw a young man 32 years of age with Dr Paul R Correll who estimated that his patient had lost eight pints of blood through vomiting. He subsequently lost considerably more by the bowels and he was pulseless when I saw him. He never vomited after he was given hot water and was removed to the hospital where he is now improving rapidly and being prepared for operation.

CONCLUSIONS

1. If the ulcer or ulcers are situated at or near the pylorus as they are in about 80 per

cent of all cases and the pyloric end of the stomach and proximal portion of the duodenum can be easily mobilized pylorotomy which gets rid of the existing ulcers and prevents future ones to a large extent removing as it does four fifths of the ulcer bearing area is certainly the operation of choice. The frequency with which hemorrhage perforation and cancer especially the latter follow gastro-enterostomy how it to be wholly inadequate. Moreover the radical operation of excision and pylorotomy are only slightly more dangerous while far more beneficial in every way than gastro-enterostomy.

2 If however the converse obtain the stomach and duodenum being bound down by adhesions to adjacent viscera such as the pancreas liver gall bladder transverse colon etc simple gastro-enterostomy the anastomosis being made about the middle of the stomach should be practiced. If the symptoms are not relieved within a reasonable time then pylorotomy may be performed more safely. Before such a step is taken the operator should be assured that the gastro-enterostomy is patent and functioning.

3 The operation can also be done in two stages in those patients not in good condition whether it be from hemorrhage anasthetic or other cause. It is often best to perform pylorotomy for cancer in two stages and

practically the same is true in ulcer operations, but it will be much less frequently the case.

4 Chronic ulcers duodenal as well as more frequently multiple than is appreciated some excellent authorities state that such usually the case. With the number and chronicity of ulcers potential dangers are increased and radical measures are more urgently called for.

5 Ulcers away from the pyloric end that occupying the extended four fifths of the stomach should preferably be treated by partial gastricotomy or removal of the ulcerated area. Although such ulcers rarely undergo cancerization they frequently bleed and perforate both of which dangers are increased by the free movements of this portion of the stomach during respiration. Moreover on this account protective adhesions are less apt to form about them if we except the lesser curvature which is relatively immobile. If simple excision is practicable it should be done as it produces a smaller mortality (17 per cent) than gastro-enterostomy.

6 In some cases it may be wise though it is not usually so to supplement excision by gastric jejunostomy. It all depends upon the location and size of the ulcer and whether or not the stomach can presumably carry on its functions without irritating stretching or otherwise interfering with the line of suture.

TRANSPLANTATION OF OVARIIS

BY PROFESSOR TII ODORI TUSHER, PARIS, FRANCE

HOMOGRAFTING

MY purpose in addressing you on this subject is to lay before you my experience in grafting ovaries in the hope that menstruation might be preserved after operations for salpingitis and fibroids of the uterus. During the past eight years from November 15 1906 to July 15 1914 I have performed two hundred and four operations thirty five of which cannot be considered in this paper as they were performed only recently. These operations were not all of equal importance.

Homografting or the transplantation of ovaries from one patient to another I have performed twenty four times under the most favorable circumstances but it did not prove successful. I have performed seven heterograftings immediately after the removal of an ovary or after the gland had been preserved in cold storage from one hour to forty four days and the operation has never given me a single functional result. I have transplanted an ovary from one young woman to another

who presented after the removal of ovaries and tubes very severe symptoms simulating change of life. There was every chance of success for the patients were of the same age of the same complexion and had the same color hair. I should have been successful but the blood of the patients was either hemolyzed or agglutinated on coming in contact. The disturbances were the same after as before the transplantation the patients had all the symptoms of menopause and after some months the ovary gradually decreased in size.

I think however that with an improvement in technique we may later succeed in this procedure because the mechanism of absorption in such cases is well known. It is the same as for any foreign element — the foreign element being destroyed by the macrocytes. If we could prevent the macrocytes from attacking the grafted ovaries it would be possible to obtain success. We already have learned from Carrel's experiments that the transplantation of limbs always gives a better result when the animal is infected. It is probable that the macrocytes in infected cases are occupied in struggling with the microbes and consequently are unable to attack the grafted limb. While it is not within the province of surgery to produce infection in the human body we do hope that some chemical substance will be discovered that may be used to protect the grafted ovary from an attack by the macrocytes.

AUTOGRAFTING

The most interesting operations are those for autografting — the process of grafting a woman's ovary in her own body. I have performed one hundred and forty five of these operations. Two circumstances under which the operations were performed may be cited. First total hysterectomy and transplantation of one or both ovaries in whole or in part. Eighty four operations were performed in this way. The graft takes and every month it increases in size. This continues for two or three years, but without any benefit to the patient. Second in salpingitis I leave the uterus in place, remove the two adnexa and then graft either one or both ovaries. Sixty

five operations have been performed following this technique.

In discussing the subject of grafting ovaries in a part of the body retaining the uterus in its position I would call attention to the following points:

- 1 Justification for this operation
- 2 Surgical technique.
- 3 Results
- 4 Indications and future possibilities.

I JUSTIFICATION FOR THIS OPERATION

Leaving the uterus in place when transplanting the ovaries has for its object the suppression of pain and the preservation of menstruation. My results already published with respect to the congestive trophic and nervous accidents in young women after the suppression of menstruation are all well known. These symptoms persist for a very long time and are often severe but if the patients could be spared such trials by undergoing a slight and efficacious operation they would be benefited greatly.

2 SURGICAL TECHNIQUE

After salpingectomy the ovary may be left in the abdomen if necessary or it may be grafted near the uterus or in some other place as under the skin of the abdominal wall. I have now abandoned these methods because after operation the patients very often complain of pain and a second laparotomy or a new section is necessary to remove the ovaries. However in certain cases of tubal disease without general pelvic inflammation the ovaries may be left in place successfully. Two of my patients who were operated upon ten and five years ago respectively are now in very good condition. I prefer the following technique:

In a case of chronic salpingitis the abdomen is opened and all the adhesions are broken up. I hold in my fingers the ovary and tube. The gland is isolated with forceps and the pedicle cut. I take the ovary in a sterilized compress, the peritoneum of the abdominal wall is separated by the finger deeply inserted into the adipose tissue and the ovary put into this opening and left there. I remove the tube and secure the bleeding edge of the broad

cent of all cases and the pyloric end of the stomach and proximal portion of the duodenum can be easily mobilized pylorotomy which gets rid of the existing ulcers and prevents future ones to a large extent remaining as it does four fifths of the ulcer bearing area is certainly the operation of choice. The frequency with which hemorrhage perforation and cancer especially the latter follow gastroenterostomy how it to be wholly inadequate. Moreover the radical operations of excision and pylorotomy are only slightly more dangerous while far more beneficial in every way than gastroenterostomy.

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Course following operation After the removal of the tubes the infection of the organs and the pain are overcome provided the operation is performed under favorable circumstances and with good technique By vaginal examination the uterus is found not painful and is quite free Before menstruation the side of the grafted ovary remains tender for some days — four of our cases were quite painful It is to be noted that the flow is profuse or less profuse than it was previous to operation but in most instances it is increased

Included in my reports are some cases which I would not graft now These were (1) three women aged 40 41 and 42 years respectively who suffered from the engrafted ovaries although they presented all the symptoms of change of life (2) two septic cases 20 and 23 years old respectively which proved unsuccessful because the ovaries had previously been passed through the flame of a lamp

The results are the same whether one or two ovaries are grafted I have done twenty eight autografts of both ovaries and have interviewed later twenty of these patients nineteen of whom had regular menstruation I have done thirty seven autografts of one ovary and from this series seventeen patients came to see me again and thirteen had regular periods Of those having amenorrhoea one was over forty years old

It is possible that our results may be open to question since when even a small part of the gland is left inside the abdomen menstruation can be reestablished and this result is attributed to the grafted ovary This mistake can be avoided by observing the following factors When menstruation is dependent on a part of the ovary left in the abdomen (1) it appears two months after the operation and I have never seen such a quick result from a graft (2) the grafted ovary does not become enlarged just preceding menstruation and it is curious to note that every time one ovary has been grafted and the other left in the abdomen the graft never produces menstruation

(b) *Anatomical* Are the grafted ovaries the real cause of this menstruation? I will give some anatomical proofs Through experimentation and the examination of trans-

plants I have been able to establish the anatomical condition of the glands grafted I will leave the experimental unfinished part and will explain the macroscopical and microscopical findings in human ovaries removed two to three years after they were transplanted

Maney Age 39 transplant removed after four and one-half years Macroscopically a corpus luteum is found

Mamy Age 28 transplant removed after three years contained a cyst the size of a nut the veins and two arteries were the size of the finger On microscopic examination we find the connective tissue divided into two parts the external part is very thick containing many vessels the internal part not so thick but with many small vessels The epithelial zone consists of variable cells It may be said that the specimen is a blood cyst which has developed from a corpus luteum

Cofins Age 24 transplant removed two years after regular menstrual flow had been established The specimen contained a cyst in which two parts were seen The external part consisted of fibroid tissue the internal of connective tissue The epithelial zone was regular except where small hemorrhages were found The cyst had developed from a graafian follicle

Priolet Age 44 transplant removed after three years Fibroid degeneration

(c) *Physiological deductions* My operations by giving me the opportunity of learning that the ovaries become congested from five to twelve days before catamenial flow prove that this period of congestion is longer than it was hitherto thought to be

The engrafted ovary passes through two phases The first phase is very long lasting from four to six months during which the function of the organ is not in evidence Then comes the second phase during which the ovary passes through regular monthly congestive periods — a proof of good vitality If menstruation does not appear the patient exhibits signs and symptoms of the menopause We may conclude therefore that monthly ovulation alone cannot prevent the menopausal distress in contradiction to the classical opinion held up to the present time From this I conclude that ovulation and the internal secretion are not so important as is generally believed The real cause of the symptoms lies in the suppression of menstruation the proof of which is the fact that as

ligament after which the peritoneum is completely closed by a continuous suture with a curved needle and fine catgut. The point is particularly important since it insures the future mobility of the uterus and restores the broad ligament to its normal state. The abdominal wall is closed with three rows of sutures after I have ascertained that the ovaries are still in place and are without blood around them.

Certain points in the procedure should be understood and I will endeavor to explain them. When the glands are surrounded by adhesions they are very often torn in freeing them their surface becomes irregular and they appear wasted. Often also they are sclerosed or contain cysts but even in such instances the gland may be made use of and the results are good. If the glands are not quite atrophic they may be dipped into tincture of iodine or passed through the flame of a lamp. The result in these cases is not so good the majority of patients not maintaining for a long time. In case of cystic changes the ovaries must be opened before grafting. These ovaries however have always given good results. A small section of the pedicle of the glands sometime needed to enlarge the surface for future adhesions. In some recent cases the glands were divided into equal parts and implanted separately. This is done in order to obtain the milk grafts and larger surfaces for adhesions.

3. RESULTS

I shall explain successively the (a) clinical (b) anatomical and (c) physiological results.

(a) *Clinical* After the transplantation where the uterus is left in place the ovary remains unaltered for three or four months and seems to be dormant. Sometimes it is a little tender and the patient has all the symptoms of change of life. But after a while the ovary becomes active enlarges and is sometimes painful for five or six days whereupon all symptoms subside and menstruation reappears. Generally the congestion of the ovary precedes menstruation by five or ten days. On the same day when menstruation has commenced all the symptoms of menopause disappear entirely. After a month or

so ovulation again takes place. It is certain that with the grafting of an ovary the normal condition of the patient can be maintained.

The operation presents no more danger than does classical hysterectomy. Of sixty-five patients upon whom I performed autografting operation without hysterectomy I have interviewed thirty-seven from one to ten years after operation and thirty-two had their period regularly. In the five cases which did not have regular periods two important points were noticed first the patients were either more than fifty years old or second they were hysterectomized where it was necessary for me to dip the graft into tincture of iodine.

Number of months between the operation and the first menstruation

1 month	2 cases	6 months	1 case
3 months	1 case	9 months	1 case
4 months	2 cases	1 year	1 case
5 months	4 cases		

Number of months between the operation and the last medical examination in women who are still menstruating

16 months	1 case	1 month	1 case
21 months	1 case	4 months	2 cases
24 months	1 case	7 months	3 cases
1 year	1 case	8 months	1 case
2 years	1 case	9 months	1 case
3 years	1 case	10 months	1 case
4 years	1 case	11 months	1 case
5 years	1 case	12 months	1 case

Number of months between the operation and the menopause

1 month	1 case	3 months	1 case
4 months	1 case	5 months	1 case

From the above it is noted that certain patients have the change of life sometimes from one to three years after the operation. The new condition of the life of the ovaries explains this fact.

One patient was noted but once one patient menstruated but twice no patient menstruated only four times. One patient had severe catamenial hemorrhages requiring curettage one patient had severe catamenial hemorrhages but did not require curettage one patient had regular periods but very irregular one patient had irregular periods being sometimes three months without any hemorrhages.

These cases prove that sometimes the monthly flow is irregular.

Course following operation After the removal of the tubes the infection of the organs and the pain are overcome provided the operation is performed under favorable circumstances and with good technique. By vaginal examination the uterus is found not painful and is quite free. Before menstruation the side of the grafted ovary remains tender for some days — four of our cases were quite painful. It is to be noted that the flow is profuse or less profuse than it was previous to operation but in most instances it is increased.

Included in my reports are some cases which I would not graft now. These were (1) three women aged 40, 41 and 42 years respectively who suffered from the engrafted ovaries although they presented all the symptoms of change of life. (2) two septic cases 20 and 23 years old respectively which proved unsuccessful because the ovaries had previously been passed through the flame of a lamp.

The results are the same whether one or two ovaries are grafted. I have done twenty-eight autografts of both ovaries and have interviewed later twenty of these patients nineteen of whom had regular menstruation. I have done thirty-seven autografts of one ovary and from this series seventeen patients came to see me again and thirteen had regular periods. Of those having amenorrhoea one was over forty years old.

It is possible that our results may be open to question since when even a small part of the gland is left inside the abdomen menstruation can be reestablished and this result is attributed to the grafted ovary. This mistake can be avoided by observing the following factors. When menstruation is dependent on a part of the ovary left in the abdomen, (1) it appears two months after the operation and I have never seen such a quick result from a graft. (2) the grafted ovary does not become enlarged just preceding menstruation and it is curious to note that every time one ovary has been grafted and the other left in the abdomen the graft never produces menstruation.

(b) *Anatomical* Are the grafted ovaries the real cause of this menstruation? I will give some anatomical proofs. Through experimentation and the examination of trans-

plants I have been able to establish the anatomical condition of the glands grafted. I will leave the experimental unfinished part and will explain the macroscopical and microscopical findings in human ovaries removed two to three years after they were transplanted.

Maney Age 29 transplant removed after four and one half years. Macroscopically a corpus luteum is found.

Mainy Age 28 transplant removed after three years contained a cyst the size of a nut the veins and two arteries were the size of the finger. On microscopic examination we find the connective tissue divided into two parts the external part is very thick containing many vessels the internal part not so thick but with many small vessels. The epithelial zone consists of variable cells. It may be said that the specimen is a blood cyst which has developed from a corpus luteum.

Coffins Age 24 transplant removed two years after regular menstrual flow had been established. The specimen contained a cyst in which two parts were seen. The external part consisted of fibroid tissue the internal of connective tissue. The epithelial zone was regular except where small hemorrhages were found. The cyst had developed from a graafian follicle.

Piolet Age 44 transplant removed after three years. Fibroid degeneration.

(c) *Physiological deductions* My operations by giving me the opportunity of learning that the ovaries become congested from five to twelve days before catamenial flow prove that this period of congestion is longer than it was hitherto thought to be.

The engrafted ovary passes through two phases. The first phase is very long lasting from four to six months during which the function of the organ is not in evidence. Then comes the second phase during which the ovary passes through regular monthly congestive periods — a proof of good vitality. If menstruation does not appear the patient exhibits signs and symptoms of the menopause. We may conclude therefore that monthly ovulation alone cannot prevent the menopausal distress in contradiction to the classical opinion held up to the present time. From this I conclude that ovulation and the internal secretion are not so important as is generally believed. The real cause of the symptoms lies in the suppression of menstruation the proof of which is the fact that as

soon as the patients have a return of the monthly period all the symptoms of change of life disappear. Moreover if the flow stops for one month then the above mentioned troubles come back.

From all these facts I am able to deduce a new theory of menstruation. I believe that every month the female creates by internal secretion a chemical substance when this substance exists in the blood in sufficient quantity it acts on the ovary which modifies it and menstruation is consequently produced by this modified internal secretion and the secretion is eliminated with the flow. I have been able to localize this chemical substance in the blood. It exists in the serum because I can produce menstruation by injecting defibrinated blood.

If menstruation does not occur then the chemical substance is retained in the circulation and causes an auto-intoxication which we call the troubles of theurgical change of life. I can give proof for this theory. The blood of a woman immediately before menstruation contains the chemical substance which brings on menstruation—a statement proved by the fact that if blood taken from a patient just before menstruation is injected into the veins of a patient who is between two periods or whose period is delayed this injection immediately causes the menstrual flow to appear. I have carried out two experiments which confirm this assertion.

A woman age 37 had not menstruated for two years after her last confinement. An injection of 25 ccm of serum taken from my patient on the day before menstruation in the patient's menstrual period turned on the hysteric gush of the menses.

A woman age 49 at the beginning of the menstrual hysteric disorder of the nervous system thirty ccm of defibrinated blood taken

from woman naturally stopped her menstrual period was injected 1 hour after the injection menstruation came on and all the symptoms of change of life disappeared.

We might go still farther in this matter of the conservation of the ovary. If several deductions may be drawn from the results of grafting ovaries anther scientific one is still possible. I mean the resection of a part of the body of the uterus without causing change of life. What is the quantity of mucosa required by the uterus to preserve menstruation? It is yet mathematically impossible to answer this question but my own experience in two such cases permit me to say that with the engrafted ovaries a de-truction of a third part of the uterine body is not sufficient to suppress the physiological hemorrhage.

4. INDICATION AND FUTURE POSSIBILITIES

Must one do a transplantation in every case of salpingitis? All recent cases and all malignant diseases contra-indicate the procedure. After the fortieth year it is also unnecessary. Another local contra-indication exists in cases where strong adhesions are present between the ovaries and pelvis. In these cases if the uterus is not removed the patient always complains of pain in the lower abdominal region. With these exceptions I can say that I am sure that my operation is a good one. I reservation of menstruation in young and very nervous women must be preserved and especially in those suffering from hyperthyroidism as the patients often exhibit nervous and congestive trouble.

Ovulation without menstruation as I have explained altogether and improvement in heterografting is the most desirable advance at present. In closing it should be stated that where the uterus is absent ovarian transplantation is of no value.

GOITER IN CHILDREN¹

By COLMAN C. BUFORD, M.D., Chicago

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When one undertakes the study of the goiter question he must first clearly understand that the term goiter refers only to local or general enlargement of the thyroid gland and that such enlargements represent numerous and varied structural changes in the gland comprising physiologic and pathologic swellings, colloid collections, cystic degenerations, focal adenomatous, late benign and malignant neoplasms and that a number of these processes may occur simultaneously in the same gland. It is therefore apparent that in every case a diagnosis should be attempted so that one may individualize in his treatment.

In discussing this subject I shall limit myself as far as possible to my own observations in and about Chicago. I do so because I have the impression that some prominent phases of goiter vary in different communities and that by relating our own experience and observations we shall help others in their work rather than confuse them. I shall not endeavor to cover all of the diseases of the thyroid gland occurring in childhood but shall dwell only upon the frequent type of goiter of children seen in this community.

As we study the goiter question, whole certain features of goiter of childhood are worthy for use for the sake of simplicity also because of some variance in the type of goiter at different stages of childhood. I shall discuss the embryonic, childhood, and adult types of goiter separately and then discuss the combined type of goiter.

Embryonic goiter is seen in children with retarded physical development but it is extremely rare. It is characterized by the fact that the thyroid gland is enlarged and the colloid is increased. It is usually associated with a congenital defect of the thyroid gland. It is usually associated with a congenital defect of the thyroid gland.

When they co-exist at any age there is no uniformity in size, shape or pathologic characteristics. About 90 per cent of older cretins also show goiter and this is pretty generally looked upon as a glandular hypertrophy or more advanced changes resulting from hypertrophy. That the primary enlargement is due to hypertrophy is borne out by our knowledge of deficient secretion and the law of compensation and through the fact that many of the glands greatly diminish in size upon thyroid feeding. The late Dr. Walter Christophers showed me a bright little girl whom he had brought out of cretinism through thyroid feeding. Each time her feeding was stopped she reverted to cretinism and developed a goiter which was not present when on thyroid feeding. The question may well be raised as to whether physiologic or artificial compensation ever tide patients over to a period when the needed secretion is physiologically provided. This probably does not often occur because there is congenital absence of the gland in some cases and irreparable damage to it in other. It is possible that in some the gland is delayed in development and in the performance of its function and when a fed thyroid or if its administration is prolonged these children may be permanently damaged. The possibility is suggested by the following observations: A few years ago I saw with Dr. Kay of St. Luke's Hospital a patient who about fifteen months of age had been given a few months of thyroid feeding. The child showed a marked mental and physical retardation. With sufficient thyroid hormone would be sufficient to normality. In addition to that feeding record, the child had a history of at thyroid feeding in infancy.

Another case recently seen by me was a child who had been given a few months of thyroid feeding. The child showed a marked mental and physical retardation. With sufficient thyroid hormone would be sufficient to normality. In addition to that feeding record, the child had a history of at thyroid feeding in infancy.

seeing any simple goiters in children under one year of age. Dr Clifford (ruler of the Presbyterian and Cook County Hospital) has seen none in the new born and recalls seeing but one infant less than a year old having goiter and this was associated with an enlarged thymus. In looking over the bibliography I found one reference to goiter in a 16 month fetus and many but scattered references to goiter occurring in infant under one year of age. Dr I. B. Riley states that he has posted no infant at the Children Memorial Hospital having goiter and finds no reference to the subject in the pathologic record of recent years. Dr Rudolph Holmes in his obstetric practice has seen no congenital or early infantile goiter. Dr Joseph B. De Lee has observed several present at birth. One infant born to a mother had such a large thyroid gland that the child's chin was lifted and the head thrown back by it. In October 1914 I was with Dr Overton Brook at goiter in a 16 day old. The goiter appeared on the second day. The skin was dry, scurfy and wrinkled, the hair gritty and thin, the enlargement was due to local tumefaction which was firm, movable, distinctly circumscribed, the size of a pigeon's egg and located in the lower pole of the right lobe. Its size was already diminishing and at the end of two weeks Dr Brooks reported that it had entirely disappeared. He states that he had seen several goiters which appeared about the second day after birth and that they invariably disappeared early. He also states that they are found in babes born of poorly nourished mothers who live in insanitary environment. The location and character of the mass, the changes in the hair and skin as seen in above case are quite comparable to the findings in many children and some adults. Brooks' observations concerning their rapid and early disappearance suggests a physiologic enlargement peculiar to the earliest days of infancy. I do not doubt that certain congenital goiters or those occurring in early infancy may continue for indefinite periods of time.

Goiters of children. It is well known that our city lies within a goiter district. I can safely count on seeing five to ten goiters at

my clinic at the Children's Memorial Hospital each Tuesday, often constituting a third or more of the patients present, most of these are return patients. Dr Haugher recently told me that while walking on the street he could frequently count in each block three persons with goiter. I have heard Dr Carlson say that 50 per cent of the dogs coming into his laboratory have goiter.

After the period of infancy (one year of age) we see goiter with increasing frequency until between the age of 15 years and adolescence they become very numerous. In the study of the various clinical features of simple goiter in patients of all ages I have seen able to recognize a certain group of symptoms which accentuate the affection publishing my observations in the *Illinois Medical Journal* in July of this year. While studying the subject I was struck with the uniformity of local as well as constitutional findings in children. These local findings have some clinical significance and I venture to present them in detail for your consideration. They differ widely from the usual local and constitutional symptoms which characterize goiter developing during adolescence on the other hand the local findings are similar to those seen in some adults and the constitutional symptoms are very similar to those seen in most cases of adult simple goiter.

These children have almost uniformly small goiter involving a well defined area in the gland. About one in ten shows the lesion in the lower pole of the left lobe while nine of the ten appear in the lower pole of the right lobe. In both instances the antero-inferior lobule of the pole; the area involved and the thymus is often invaded. These are very variable in size but are usually about the size of a pigeon's egg when first seen. As the mass enlarges it encroaches into the median line so that it may be difficult to distinguish just where the tumor originated. Some tumors lie partly in the thymus and close to the lobe of the opposite side or actually lie well upon the opposite side. When seen early the tumor is harder than the surrounding glandular tissue and the anterior surface is still flattened and the anterior border of the lobe still sharp but the outlines of the hardened

mass are not well defined. In cases apparently more advanced the induration is more distinct and the anterior border more rounded. These appear to be areas where encapsulation has started. In cases which I believe are still further advanced the tumor is rotund the outlines definite the consistency very firm or fluctuating the neck more distinctly enlarged and encapsulation quite complete. Either of these processes usually involves a single lobule. When the primary nodule is large or if other nodules appear in the same lobe there is often the appearance of diffused enlargement in the same or both lobes. This is produced by lifting the superincumbent thyroid tissue of the lobe or by impinging upon the inner border or beneath the inferior border of the opposite lobe thus bringing that lobe into prominence. Rarely have I seen goiter in children where I have convinced myself of general enlargement of one or both lobes. An experienced finger can usually separate an indurated or encapsulated mass from the remainder of that lobe and thus demonstrate it to be the cause of the apparent diffused enlargement. The consistency of the uninvolved portion of the lobe is likely to be quite normal.

I have noted that these indurated masses are usually single and located in the lower pole. However I occasionally see multiple nodules some of which have the same form, size or consistency as the original nodule. These nodules are smaller and appear most often when the primary node is hard has never become well defined and there is marked constitutional damage. They usually occur in the zone immediately surrounding the primary node and may diffuse throughout the gland as a rule following the zonal plan of extension they never blend with the primary growth or with one another while of moderate size.

The region which were once indurated apparently may become distinctly encapsulated and grow to considerable size but this occurs only in a small percentage of cases during child life. When these encapsulated masses are removed they are found to be benign adenoma. I have recognized varying degrees of toxicity accompanying these many

are very toxic. When these undergo central degeneration they give every appearance of a cystic growth. True cysts of the thyroid are relatively rare. That the toxicity is largely due to the encapsulated tumors is shown by improvements following their removal. Unilateral thyroidectomy is not of ten indicated for thyroid adenoma of childhood single or multiple enucleation can usually be done.

There are certain nodular masses which appear in the median line immediately above the isthmus or most often below it. They vary in size consistency and mobility and have small pedicles or none. In some cases these are supernumerary thyroid lobes and contain no diseased tissue but many are lobular enlargements such as I have described which budded outward to the midline and became pedunculated or became free masses through attenuation and snapping of their pedicles. These are mistaken clinically for pretracheal cysts and if they contain colloid or fluid from central liquefaction their tracheal origin is also suggested when after removal they are sectioned and examined macroscopically. Supernumerary lobes must not be removed except in case of some unusual and clear indication. When done one must be very sure there will be sufficient healthy thyroid gland remaining.

True diffused enlargement of one or both lobes of the thyroid which shows boggy and no nodulation such as are seen among adolescents are relatively rare among the children studied by me. I recall one.

Inflammation of the thyroid is not rare among children and usually causes only temporary swelling. There is no doubt that non suppurative inflammations of the thyroid gland are causing serious troubles and are escaping recognition.

I have observed no other than these types of goiter in children in or about Chicago though for the sake of rounding out my paper I might add that this organ is the seat of neoplasms in childhood as well as in later life and that hyperthyroidism of children associated with goiter is no rare occurrence.

The chief type of goiter of childhood that I have dwelt upon is frequently associated

with diseased tonsils, which often contain great cheesy concretions or pus. All five cases examined in one afternoon contained pus in both tonsils. A sixth case had recently had a tonsillectomy. Subsequent observations have been in accord with these findings. Many of these tonsils look innocent until everted and their bases pressed upon when retained materials exude.

In the past these patients have been quite generally looked upon as well a simple goiter being a mere incident in their lives and little or no attempt has been made to compile a constitutional syndrome which usually characterizes this disease so that when one first studies these cases he may find one or more symptoms not pronounced or altogether absent and doubt arises. Careful study of a few cases with a clear understanding of the subject will remove all doubt. No single symptom stands out prominently as do the individual symptoms of hyperthyroidism but the symptom complex is there standing out just as clearly as the symptom-complex of hyperthyroidism.

The prominence of the symptoms will be largely proportionate to the apparent changes in the gland. The patients are usually below the standard of health and development the stature is frail a few seem to have grown well but are usually thin. The muscles are soft and the posture drooping they fatigue easily are languid do not enjoy play and are irritable. The face shows an old and careworn expression and many are not up to the proper school standard. They are often slovenly and are usually either slow and deliberate or abnormally alert. The voice is often weak. The hair whether silky or coarse clean or dirty oily or dry will usually show a gritty feeling this is often general but sometimes occurs in small scattered patches.

One usually feels this at the first touch and quickly loses it, perhaps on account of the oil or moisture of his own fingers. The eyes are usually bright and watery often associated with the pearly sclera seen in some malnourished or anemic children. This bright eye with other accompanying findings frequently prompts the diagnosis of hyperthyroidism. The eyes answer none of the tests

for exophthalmia. There is often a faint or distinct flush of the cheeks sometimes extending into the lower eyelids where there is excessive oiliness or moisture. This flush is a local skin hyperemia due to vasomotor disturbance. It is out of proportion to the present state of the patient's health and the findings. The skin is rarely clear or shows a healthy glow but usually the complexion is muddy sometimes yellow and the skin dry greasy or pimpled. Without cardiac or renal lesions they often show congested and mottled hand and feet which are moist and cold. The pulse rate is high. I have often seen it as high as 140 but it is usually between 80 and 120. The heart is often more tumultuous than normal or easily made so but never exhibits tachycardia such as is seen in hyperthyroidism. Careful inspection of the extended fingers will show fine fibrillary twitching of a fine choreic type or a coarse tremor or both limited to the hands and never tending to become generalized as does the fine tremor of hyperthyroidism.

There are no characteristic blood changes. The disease is not due to chlorosis, as has been frequently suggested. Any anemia present is likely to be independent or a part of the constitutional damage.

The urine sometimes shows albumin hyaline and granular casts, but when unaccounted for through the history and by organic findings and when these promptly disappear upon thyroid feeding one must look at them as being the result of vasomotor disturbance—a part of the symptom complex.

The treatment of goiter of childhood is reasonably satisfactory all possible causes should be reviewed. The drinking water should be boiled or distilled and in obstinate cases brought from a distance or when possible the child sent into a less goitrous district. The bowels should be regulated exercise and outdoor life encouraged and all focal infections cared for. Iodine in any form benefits a large percentage, but my results have been far better from the use of thyroiodine as found in desiccated thyroid extract. I have used only the Armour preparation. The child must be fed just enough to produce the slightest signs of hyperthyroidism. Some patients do

well at once without the need of pushing the drug to a toxic point. The feeding must be kept up daily for months or years according to the result obtained. Good health and proper growth must be attained and the goiter cured before the treatment is discontinued. Frequent interruptions in the treatment are thought to invite glandular hyperplasia because of suddenly throwing the gland into a state of self support. Certain experiences of my own and Morgan's case cited in a previous paper suggested this idea.

The less the encapsulation the more satisfaction results from thyroid feeding. Among those in whom there is only an indurated mass some show disappearance of their goiters in six weeks more of them in six months to a year the same occurs in those which are slightly encapsulated but in these a little nodule is likely to remain. Those showing distinct capsules shrink some in size. They may disappear when focal infections are removed and after many months or years of thyroid feeding. My experience is not encouraging. I usually enucleate these.

Many of these children while on thyroid feeding lose a little weight others remain stationary while others gain in weight. Most of the children show prompt nutritional improvement many take on growth with surprising promptness and rapidly one child was not recognized upon her return at the end of a few weeks another lost her careworn expression and her body which was emaciated filled out she became bright and active. Another with a small isolated hypertrophic mass in the median line took six months to show marked constitutional improvement at the age of seven he was like a frail child of four. His voice became strong he lost his drooping posture became filled with joy instead of being peevish and grew in that time about three inches gaining only four pounds in weight. Another boy of fifteen years who had a large mass in one lobe and who had marked stridor sunken cheeks frail stature and easy fatigue whose right heart was dilated urine loaded with albumin hyaline and granular casts systolic murmur at apex showed in about nine weeks great diminution in the size of his goiter and in ten months became of

athletic build having gained five and one half inches in height and nineteen pounds in weight. He lost his stridor in less than forty-eight hours after feeding of thyroid was begun and his urine was free from albumin and casts in two weeks.

When the encapsulated or slightly encapsulated masses begin to disappear I have observed that sooner or later I fail to recognize the former definition of outline and that the surrounding area becomes indurated shading off toward the normal gland. All of this induration finally disappears. I cannot account for this except by a round cell infiltration which may be a factor in resorption of materials in and about the mass.

The writer is well aware of the dangers of theories in these days of experimental physiology and surgery but when confronted by so many experimental difficulties with this organ we must lay our foundation for the future building of knowledge concerning it through deductions reached by analogy clinical observations and from experimental therapy. I therefore offer the following conclusions from the observations recited.

1 That simple goiter is of frequent occurrence among children in Chicago and is associated with a definite symptom complex.

2 That this symptom complex indicates a low grade of health varying in each child.

3 That goiter usually occurs in certain geographic districts and appears most frequently when certain waters are used for drinking purposes. These waters are often known to contain sewage. Our own water supply receives sewage from hundreds of farms factories villages and cities. Because of this geographic distribution of the disease corresponding to water routes receiving sewage and certain experiments showing that goiters do develop promptly when given these waters exclusively drinking water is probably the chief cause of goiter. The water content causing goiter is probably bacteria or their chemical products.

4 That focal infections particularly those of the tonsils adenoids, and teeth of children may supply the excess of bacteria ingested and produce goiter singly or in conjunction with the water supply.

damage at or after the adult period has been reached the results have been much more prompt. We do not know the cause of the usual type of gouter occurring during adolescence and must still content ourselves with that most vague explanation that it also is a diffused cell hypertrophy caused by complex changes in the glands of internal secretion which takes place at this period of life. What will benefit one of these will not always benefit another. Experience however shows that it is worth while to look to the water supply give iodine or thyro-iodine when there is no suggestion of hyperthyroidism and attend to focal infections. I always encourage early

afternoon rests in bed graded athletics and an open air life.

In discussing the subject of gouter writers give much space to the subject of gouter of infancy which is relatively rare and dwell at length upon gouter of adolescence. Neither of these subjects appears to me to be nearly so important as gouter of childhood because of its frequency the accompanying constitutional damage and the permanency of that damage. Each recognition diligent supervision and treatment will spare most of these patients future deformities resulting from gouter and restore them to a good state of health.

A REPORT OF THREE CASES OF FIBROSCLEROSIS OF THE PENIS TREATED BY RÖNTGENIZATION WITHOUT IMPROVEMENT

By CHARLES A. WATERS, M.D. AND J. A. C. COLSTON, M.D. BALTIMORE, MARYLAND

From the Departments of Actinography and Genito-Urinary Diseases of the Johns Hopkins Hospital

THE following is a brief report of three cases of the rather rare condition known as plastic induration or fibrosclerosis of the penis which were observed in the genito-urinary clinic of the Johns Hopkins Hospital and in which thorough roentgen irradiation was carried out without any appreciable improvement. Two other cases were observed but the amount of irradiation was insufficient to warrant drawing any conclusions in regard to the value of this treatment. This condition apparently does not respond to any known treatment and the favorable report of Bernasconi (1) by his method of treatment led to a thorough trial in the cases reported. Occasionally in selected cases operative procedure has been followed by successful results but in the vast majority of cases surgical interference offers very little.

The three cases reported in this paper are typical examples of the condition known variously as Peyroni's disease (from Peyroni who first described the condition), induration plastique des corps caverneux, ganglion penis, nœuds des corps caverneux, plaque

indurée, cavernitis senilis, induratic penis plastica and fibrosclerosis of the penis. The latter term would seem to be better adapted in that it is based more correctly on the pathology of the disease but German writers have given the preference to *induratio penis plastica*.

The onset is insidious usually occurring between the ages of 40 and 60 and the indurated areas are not noticed until brought suddenly to the attention of the patient by the deflected erections. These areas are firm cartilaginous in consistency and not tender. They are situated on the dorsum of the penis and are attached to one or both corpora cavernosa. Their margins are indistinctly felt and the induration gradually blends off into the normal surrounding tissue. Erections may be quite painful and sooner or later in the course of the disease intercourse is entirely prevented both for this reason and on account of the bending of the penis on erection due to the poor blood-supply of the indurated part. On this account melancholia and neurasthenia are often associated with the disease.

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The onset is insidious usually occurring between the ages of 40 and 60 and the indurated areas are not noticed until brought suddenly to the attention of the patient by the deflected erections. These areas are firm cartilaginous in consistency and not tender they are situated on the dorsum of the penis and are attached to one or both corpora cavernosa. Their margins are indistinctly felt and the induration gradually blends off into the normal surrounding tissue. Erections may be quite painful and sooner or later in the course of the disease intercourse is entirely prevented both for this reason and on account of the bending of the penis on erection due to the poor blood supply of the indurated part. On this account melancholia and neurasthenia are often associated with the disease.

The nodes usually remain unchanged or slowly progressing but cases of spontaneous regression occur the cause of which is difficult to understand and it is cases of this type which have been reported as cures under various kinds of treatment which have absolutely no effect on the progressive cases (zur Verth and Scheele (2)) Exhaustive studies on the pathology of the condition principally by Galewky and Hubener (3) Tuffier and Claude (4) Chetwood (5) Sachs (6) Frangenheim (7) Stopczynski (8) and zur Verth and Scheele (2) show that the process arises first in the loose areolar tissue lying external to the tunica albuginea and in the tunica albuginea itself the septum and corpora cavernosa becoming invaded by the extension of the process In the later stages there may be development of cartilage and even true bone and this side of the subject has been extensively studied by Frangenheim

The frequent occurrence of the diseases of metabolism in chronic rheumatism (as in our three cases) gout diabetes etc certainly suggests that there is a definite relationship of the disease with disturbances of metabolism It has also been noticed in cases of Dupuytren's contracture (Neumark (9)) According to Sachs (6) these nodes arise in the tunica albuginea being formed solely from the fibroblasts which surround the smaller vessel and are entirely without the association of inflammatory elements The first stage occurs a cellular proliferation in the tunica albuginea gradually replacing the elastic fibril which are normally present there and the process may continue to the development of osteoblasts from the connective tissue fibril thence to true bone formation

Tuffier (10) considers that the condition is an age phenomenon of the elastic tissue and concludes after an examination of 2500 cadavers that a physiologic thickening of the septum and tunica albuginea occurs in old men with a disappearance of elastic fibers These changes are accentuated in arthritis which affects mainly the fibrous system — topus arthritis deformans Dupuytren's contracture etc — and the indurated areas can be compared to similar degenera-

tions in the joints capsules, and aponeuroses of old men Aschoff (11) also states that elastic tissue loses its elasticity after the fourth decade due to connective-tissue proliferation

Fibrosclerosis may also occur as a result of hemorrhages in the tissues and may be of specific origin The cases reported cured by potassium iodide probably belong to this latter group

The prognosis is very unfavorable the lesions slowly progressing and resisting all therapeutic efforts Mercury and iodides are effectual only in cases of specific etiology Local applications baths, massage galvanic and faradic current arsenic internally and many other methods have been used with little or no result Walach (12) has reported a case cured by subcutaneous injections of fibrolysin but other authors have had no result with this drug

Posner (13) first suggested treatment by roentgen ray and Bernasconi (1) reported the first cure by this method His patient a man aged 34 with a rheumatic history was cured with complete disappearance of all indurated areas after eighteen treatments Zur Verth and Scheele (2) reported three cases treated by irradiation two of them without benefit In one case there was symptomatic improvement and the indurated area was smaller but still present when the patient was seen after a year Only ten treatments were given to this patient and it seems doubtful if lasting improvement could occur when our cases failed to show any regression after the most intensive roentgenization

A confusing factor which may lead to the premature report of a cure or improvement is the general infiltration of the surrounding tissues due to the irradiation which tends to obliterate the outlines of the sclerosis and which occurred in Case 1

The operative treatment offers by far the most encouraging prospect Galewky and Hubener (3) report the first successful operation and since then several cases have been cured in this way A careful dissection of the plaques should be made with as little hemorrhage as possible and local anesthesia should not be used as the outlines of the affected

tissues are obscured. Recurrences frequently occur as can be readily understood from the hemorrhage and the difficulty in accurately outlining and removing the diseased tissue. However zur Verth and Scheele have collected from the literature fourteen cases which have been operated upon with eight cures one improvement two recurrences and three lost sight of. It would seem nevertheless that the percentage of successful cases would be considerably lower than this. Operation has not been carried out in any of our cases but Bloodgood (personal communication) has had one case which has been cured. In another case operated on by Young (personal communication) the distal end of the indurated area was dissected free and sewed into the foreskin with restoration of function at the last time the patient reported five years after operation.

CASE 1. J. C. age 59 unmarried. First seen July 23, 1913 complaining of inability to have sexual intercourse on account of the upward bending of the penis. The patient gave a history of rheumatism for twenty five years. The present condition was first noticed five years ago and made rapid progress but for the last four years has remained stationary.

On examination of the penis an indurated mass extended along the median line from the glans back between the corpora cavernosa for a distance of about 4 cm. In its thickest portion the mass is 1 cm in diameter tapering gradually until it is lost proximally in the last 3 cm of the penis and finally in the glans. Throughout its extent it is smooth and cartilaginous in consistency. The flaccid penis has a distinct upward curvature.

Röntgenogram of the penis was negative for shadows of ossification. Wassermann reaction was negative. Diagnosis of fibrosclerosis made and intensive roentgenization immediately started.

First treatment was given on July 23 on the anterior surface of the penis the abdomen, testicles and pubic region being protected with sheet lead. A treatment was given every day.

The technique for the first fifteen treatments was as follows. A 2 mm filter was used to protect the skin from detrimental effects of the soft rays. Focal distance 20 cm. Pistille and filter distance 10 cm. The Sabouraud-Voiré pistille and Holz-Knecht radiometric system was employed. The pistille was placed just under the aluminum filter and protected from heat light and dust with a piece of ordinary black wrapping paper. A hard tube with the penetration of 10 to 12 Benoist was used that is after the interposing of the aluminum filter before which the tube would have had the

penetration of 6 to 8 Benoist. We have employed tubes 6 to 8 Benoist as a standard in other cases. The penetration is increased a trifle more however when 3 mm of aluminum are used as we are now using in these cases. The duration of each irradiation was three minutes the milli amperage 8 to 10 dose 2 H. After the sixth irradiation patient said erection was better. This we believe to be a pure psychic effect as no change in the mass could be detected.

August 11th patient awoke in the early morning with pain swelling and redness of the penis. Examination showed a mild erythema and irradiations were discontinued. August 12th he developed a balanitis and paraphimosis with a purulent discharge but repeated microscopical examinations of the discharge failed to show gonococci. Progressive changes in the reaction to irradiation occurred until August 21st when the symptoms began to subside.

Summary shows that he had received a dose of 30 H on the same area over a period of sixteen days six times the erythema dose. He reported again on September 2d after a rest of ten days. The penis was not inflamed but the mass showed no appreciable change the dimensions being 4 cm long $3\frac{1}{2}$ cm wide $3\frac{1}{2}$ cm thick.

September 2d irradiation was again started with slight alteration in technique. A 3 mm aluminum filter was substituted in place of the 2 mm as formerly used and irradiations given daily. On October 20th patient reports that erection was more vigorous than at any other time during the past five years but no change could be made out in the extent of the induration. November 4th patient reports decrease in the area of induration. Examination shows an easily demonstrable diminution in the size of the area of induration which now measures about 1.5 cm in length with a corresponding decrease in diameter thus however we later determined was due to the infiltration in the tissues around the indurated area caused by the massive roentgenization. The appearance of the treated area is normal there is no pigmentation scaling erythema or signs of roentgenism. December 5th patient returns after an omission of all treatment for one month. The mass appears definitely outlined and apparently of the same dimensions as when first observed 4 by $3\frac{1}{2}$ by $3\frac{1}{2}$ cm.

In all a total of sixty two irradiations was given over a period of nearly four months. The irradiations after September 2d were given on the posterior surface the penis being reflected back on the abdomen making a total of forty six such irradiations of nine erythema doses on the same surface over a period of not quite two months.

The infiltration of the surrounding tissues has now disappeared so that the unchanged indurated mass could be made out as definitely present and not appreciably changed.

CASE 2. J. W. F. age 62 married. Came for consultation on October 16, 1913 complaining of deflected or crooked erections and a hard lump in his

penis Family history negative He has never had gout but states that during the past two years has had some indefinite rheumatic pains and the distal points of his fingers have slowly but painlessly swelled There have been no other joints involved

This condition was first noticed in February, 1913 when he awoke at night with an erection and noticed the penis bent in such a manner that the glans was directed obliquely toward the abdominal wall There was only slight pain at this time and he noticed a hard lump on the anterior surface of the penis near the glans The penis has been similarly bent at each erect on since this time and some what painful, but intercourse is still possible The patient thinks the lump is spreading; both directions and the bend is becoming more and more pronounced Examination of the penis reveals an extensive long indurated mass apparently attached to the corpora cavernosa measuring about 5 cm in length and 2 cm across in its thickest portion It is hard cartilaginous and nodular and tends back between the corpora cavernosa to the triangular ligament The skin over the mass is freely movable and the corpus spongiosum is normal There is slight prostatic enlargement Wassermann test negative and roentgenogram of the penis is negative for shadows of ossification

A diagnosis of fibrosclerosis was made and treatment started at once Irradiation was started on October 17, 1913 and a 3 mm aluminum filter used also in this case A 35% H dose was given daily until November 4th to the anterior surface of the penis At this time there appeared a slight reddening with some infiltration of the tissues but not to such a great extent as in Case 1 and there was no apparent change in the size of the induration The patient also noticed no change in his symptoms the erections still remaining markedly bowed

December 5th the patient returns and the mass shows no change there is no infiltration of the tissues or cutaneous reaction The irradiations were resumed daily using the same technique on the anterior surface until December 21st when the patient went home On December 24th he wrote that there was some inflammation of the skin with the formation of vesicles but no appreciable hang in the lump and erections still bowed On January 13, 1914 the patient reported for observation and the mass could be felt practically unchanged and there was no evidence of reaction Daily irradiations of 35% H were given but to the posterior surface of the penis until February 9th On this date a beginning reaction to treatment was noted and irradiations discontinued Careful examination showed beginning infiltration of the tissues but no definite change could be detected; the size and consistency of the mass On May 15th the patient wrote that the reactions were still bowed and the mass apparently unchanged

CASE 3 J. H. K. age 47 married was first seen on September 8, 1913 complaining of bending of the penis on erection Family history negative

He has suffered from boyhood with rheumatic pains in the back and shoulders and states that his feet and ankles have at times been swollen and red Had gonorrhea at the age of 27 discharge lasting three or four months then completely disappearing Patient had another attack of gonorrhea a year later which lasted only three or four weeks and a year later a sore on the penis which was diagnosed a hard chancre and received antisyphilitic treatment at intervals for a period of two years There was no sore throat skin erupt on alopecia or other evidence of secondary symptoms

The patient first noticed that the penis was bowed erection, six weeks ago At the same time he noticed a small lump on the right side of the penis and a larger one on the left side These are hard but not tender and he has no pain when the penis is erect He has not attempted intercourse since this trouble

On palpation there is a distinct induration in the septum and left corpora cavernosa beginning about 5 cm proximal to the coronal sulcus and extending back for about 3 cm This indurated area is about 1 cm in diameter in its broadest portion There is a similar area felt in the right corpus cavernosum about 3 by 1 cm in dimensions Both are freely movable and the corpora spongiosum is normal Prostate normal Wassermann reaction negative and roentgenogram shows no evidence of areas of ossification

A diagnosis of fibrosclerosis was made and treatment immediately started Irradiations were started on November 4, 1913 using the same technique as in Case 2 Daily treatments were given to the anterior surface until November 13th when the exposures were directed to the posterior surface until November 15th giving eight irradiations to the anterior surface and three to the posterior There was slight infiltration of the tissues and apparently some diminution in the size of the indurated areas The patient returned home and reported by letter a week later that there was reddening and swelling of the penis

On January 15, 1914 he again reported by letter that the reaction which he had noticed on returning home had rapidly disappeared without any untoward symptoms and the infiltration had gradually disappeared The lumps however have remained unchanged and the patient thinks that there is no diminution in their size and induration The reactions are still bowed Although this patient has not been seen since the irradiations were discontinued there seems to be little doubt that the indurated areas have been affected although the dose given was sufficient to cause definite reaction

CONCLUSIONS

1. Rontgenization even when very intensive has apparently no temporary and certainly no permanent effect on fibrosclerosis of the penis

penis. Family history negative. He has never had gout but states that during the past two years has had some indefinite rheumatic pains and the distal points of his fingers have slowly but painlessly swelled. There have been no other joints involved.

This condition was first noticed in February 1913 when he awoke at night with an erection and noticed the penis bent in such a manner that the glans was directed obliquely toward the abdominal wall. There was only slight pain at this time and he noticed a hard lump on the anterior surface of the penis near the glans. The penis has been similarly bent at each erection since this time and intercourse is still possible. The patient thinks the lump is spreading in both directions and the bend is becoming more and more pronounced. Examination of the penis reveals an extensive longitudinal mass apparently attached to the corpora cavernosa measuring about 5 cm in length and 2 cm across in its thickest portion. It is hard cartilaginous and nodular and extends back between the corpora cavernosa to the triangular ligament. The skin over the mass is freely movable and the corpus spongiosum is normal. There is slight prostatic enlargement. Wassermann test negative and roentgenogram of the penis is negative for shadows of ossification.

A diagnosis of fibrosclerosis was made and treatment started at once. Irradiation was started on October 17, 1913 and a 3 mm aluminum filter used also in this case. A 355 H dose was given daily until November 14th to the anterior surface of the penis. At this time there appeared a slight redness with some infiltration of the tissues but not to such a great extent as in Case 1 and there was no apparent change in the size of the induration. The patient also noticed no change in his symptoms. The erections still remained markedly bowed.

December 5th the patient returned and the mass showed no change. There is no infiltration of the tissues or cutaneous reaction. The irradiations were resumed daily using the same technique over the anterior surface until December 11th when the patient went home. On December 14th he wrote that there was some inflammation of the skin with the formation of vesicles but no appreciable change in the lump and rectum still bowed. On January 22, 1914 the patient reported for observation and the mass could be felt practically unchanged and there was no evidence of reaction. Daily radiations of 355 H were given but to the posterior surface of the penis until February 9th. On this date a beginning reaction to treatment was noted and irradiations discontinued. Careful examination showed a beginning infiltration of the tissues but no definite change could be detected. The size and consistency of the mass. On May 15th the patient wrote that the erections were still bowed and the mass apparently unchanged.

CASE 3. J. B. K. age 47 married was first seen on September 18, 1913 complaining of bending of the penis on erection. Family history negative.

He has suffered from boyhood with rheumatic pains in the back and shoulders and states that his feet and ankles have at times become swollen and red. Had gonorrhea at the age of 27 discharge lasting three or four months then completely disappearing. Patient had another attack of gonorrhea a year later which lasted only three or four weeks and a year later a sore on the penis which was diagnosed as a hard chancre and received antisyphilitic treatment at intervals for a period of two years. There was no sore throat, skin eruption, alopecia or other evidence of secondary symptoms.

The patient first noticed that the penis was bowed on erection six weeks ago. At the same time he noticed a small lump on the right side of the penis and a larger one on the left side. These are hard but not tender and he has no pain when the penis is erect. He has not attempted intercourse since this trouble.

On palpation there is a distinct induration in the septum and left corpora cavernosa, beginning about 5 cm proximal to the coronal ulcer and extending back for about 3 cm. This indurated area is about 2 cm in diameter in its broadest portion. There is a similar area felt in the right corpus cavernosum about 3 by 1 cm in dimensions. Both are freely movable and the corpus spongiosum is normal. Prostate normal. Wassermann reaction negative and roentgenogram shows no evidence of areas of ossification.

A diagnosis of fibrosclerosis was made and treatment immediately started. Irradiations were started on November 4, 1913 using the same technique as in Case 2. Daily treatments were given to the anterior surface until November 13th when the exposures were directed to the posterior surface until November 15th giving eight irradiations to the anterior surface and three to the posterior. There was a slight infiltration of the tissue and apparently some diminution in the size of the indurated areas. The patient returned home and reported by letter one week later that there was reddening and swelling of the penis.

On January 15, 1914 he again reported by letter that the reaction which he had noticed on returning home had rapidly disappeared without any further symptoms and the infiltration had gradually disappeared. The lumps however have remained unchanged and the patient thinks that there is no diminution in their size and induration. The erections are still bowed. Although this patient has not been seen since the irradiations were discontinued it seems to be little doubt that the indurated areas have not been affected although the dosage was sufficient to cause a definite reaction.

CONCLUSIONS

1. Rontgenization even when very intensive has apparently no temporary and certainly no permanent effect on fibrosclerosis of the penis.

are made up of fibrous and muscular tissue and on that account concern us most. They are unstripped muscular prolongations from the uterus and therefore are affected and behave in a manner not unlike the uterine muscularis. They become softened and relaxed in similar circumstances and suffer the effects of puerperal infection when it extends to the peritoneum or parametrium. They may even become thickened or hypertrophied in pregnancy and in chronic inflammatory (vascular) conditions of the cervix such as carcinoma and be mistaken for an extension of the disease. In health the muscle lends elasticity to the ligaments—not the contractility that is characteristic of voluntary muscle but resiliency. It contributes to motion and rebounds and assists in controlling physiological mobility of the uterus. But one of its main uses is its capability of hypertrophy and participation in bearing the increasing weight in the early months of pregnancy.

These ligaments in pairs possess individual functions. The round ligaments running from the cornua upward outward and forward to the inguinal canal are so placed that they cannot effect a sustaining influence upon the uterus in the normal position nor are they put upon severe strain until the cervix protrudes from the vagina for the uterus in backward and downward displacement describes an arc the radius of which is represented by this pair of ligaments—and the radius of an arc is constant (Fig 1+). The function of the round ligaments is to hold the fundus forward and to maintain its even balance in the pelvis. But when imperfectly developed relaxed or elongated they fail in this specific function then from the effect of posture or excessive distention of the bladder etc retroflexion occurs.

The upper uteropelvic ligament extending from a point below the attachment of the fallopian tube to the uterus outward to the lateral wall of the pelvis possesses a limited range of utility. They are extremely small and from their points of attachment and from the naturally relaxed state of the upper border of the broad ligaments cannot directly hold up the pelvic organs. Like the round ligaments they act as guys to the top of the womb

The inferior uteropelvic ligaments being attached to the side of the cervicocorporeal junction and walls of the pelvis above the obturator muscle and lying in the plane of the broad ligaments exert an upward and lateral traction and have a tendency to prevent downward and backward motion of the uterus in the direction of its long axis (Fig 2 and Fig 2+). They do not act as aids to the uterosacrals in holding the cervix in the posterior section of the pelvis except as counter tractors. A line passing along one of the inferior uteropelvic muscles through the cervix and up the other would form an angle at the point where it traverses the neck of the uterus. The cervix therefore may be said to be sitting in a swing formed by these two bands of muscular tissue and so far as the control of these bands is concerned it might swing back and forth with little restraint. They do not hold the neck of the uterus in the hollow of the sacrum as claimed by some authors as is proved by the relations here described. If the lateral traction is sufficient to exert such an influence it is so limited that very slight relaxation of the muscles will permit the lower segment of the uterus to advance to the vaginal orifice¹ (Fig 2+).

Anatomists with few exceptions describe the uterosacral ligaments in common and agree that they are flat muscular bands extending from the junction of the body and cervix of the uterus to the articulation of the second and third sacral bones or to the sacrum opposite the lower border of the sacro iliac joint. The muscular fibers which run in the uterosacral ligaments are more or less continuous not only with the fibers of the uterus but with the muscular fibers about the region where the ureters enter. There are also muscular bundles running from the sides of the bladder—below where the ureter enters—to the vagina and again from the vagina to the walls of the rectum.²

Motion imparted to the uterus by upper imposed force puts the uterosacral ligaments upon a strain in the direction of their longitudinal dimensions. The neck of the uterus cannot

move forward without relaxation or unless the pressure is sufficient to stretch these ligaments. They therefore limit the motion of the lower pole of the uterus and maintain it in a more or less fixed position in the posterior part of the pelvis. They preserve the balance and equalize the strain in front and behind the uterus maintain the normal size of Douglas pouch and help to turn the body and fundus of the uterus forward in such a way that intra-abdominal pressure is exerted upon its posterior surface with a tendency to antevert the organ.

The principal parts of the buoyant supports or the pelvic floor are the levator ani muscle (including the coccygeus), the rectovesical and deep pelvic fascia, the triangular ligaments, and the coccyx.

The periphery of the levator muscle being attached to the sides of the pelvis and its central portion to the coccyx is deeply concaved and resembles a bowl with its rim tilted forward and upward, the plane of which cuts the horizon at an angle of about forty-five degrees. The central point of its concaved bottom is behind the anus and the bowl-like muscle therefore is represented as lying upon its side through which the rectum and vagina pass. These two canals incline upward and backward at sharp angles to the side of the muscular bowl and lie directly upon its inner surface. The uterus and the bladder rest upon both of them. The uterus inclined as here described lies nearly parallel to the puborectal portion of the muscle and quite parallel to the external margins of the vaginal orifice. Its anterior surface is then presented to the sides of this muscular bowl and the vaginal outlet.

Under excessive strain the uterus would be driven down upon the bladder and vagina and in turn would force these organs upon the levator muscle and into the vaginal introitus covering the latter with its broadest dimensions and not with its wedge-like extremity (the cervix) and would effectually block its own expulsion. The pelvic floor is so constructed that it becomes the greatest support of the pelvic viscera taking 75 per cent of the strain.

PHYSICAL FEATURES

Having set up the principles of force and resistance the physical features involved now require attention.

Pressure contained within a cavity exerts its influence in all directions equally and can be no greater than the weakest point of the container for it seeks the direction of least resistance. If a ball be placed in a closed cylinder surrounded with water or other fluid and subjected to pressure the force will be distributed equally over the surface of the ball. If in place of water the ball be surrounded by numerous rubber bags or tubes containing water and air the effect will be the same. If in place of the ball the uterus be substituted the pressure within the container would be expended upon it in identically the same way. Further if the closed cylinder be substituted by the abdominal and pelvic cavities and the intestines be represented as taking the place of the rubber tubes, it will be apparent that the effect of pressure within the abdominal cavity is not unlike that exerted upon the ball in the cylinder, that is, an equal distribution of pressure above, behind, and in front of the uterus—or upon all of its exposed parts (Fig. 1).

If the pelvic supports were absolutely rigid, it would be contrary to any known law of physics for intra-abdominal pressure to disturb the position of the uterus. But as such is not the case and since it has been shown that abdominal dynamics do influence the pelvic organs, some change in the position or relation of the structures below and external to the pelvic peritoneum must take place before this force can alter the balance of the uterus. Then as the tendency of abdominal pressure is to drive the pelvic organs and floor of the pelvis directly before it the weaker parts become the most impressed while the more fixed tissues suffer the least displacement.

In changing conditions the surface of the uterus exposed to pressure varies which circumstance necessitates a comparison of the dynamic influence on different parts of that organ. This we can do by relative expressions.

The illustrations for Fig. 1 was made with an adjustable or movable picture that is too complicated to put in print.

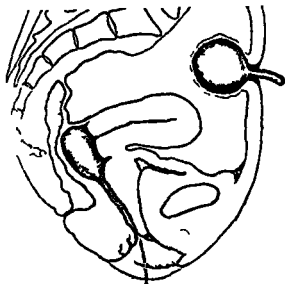


Fig 1—When testing intra-abdominal pressure the inflated bag was put within the inverted sack of suitable post-operative or other hernias which were free from obstructive adhesions

only on account of inability accurately to measure the surface of the pelvic peritoneum and accordingly a system of units has been adopted to take the place of customary notations in pounds ounces etc

In this matter effects must be reckoned with respect to the center around which the uterus rotates in backward and downward displacements. It is located near the internal os at the attachment of the uterosacral ligaments; its axis lies transversely in the base of the broad ligaments. I have called it the pivotal point. As the uterus is balanced on this point by reason of its posterior ligamentous attachments comparison of pressure upon its lower and upper poles must be made with this center as a line of demarcation between the two extremities.

Parts of the uterus exposed to pressure coincide with its peritoneal coverings. Its area on the lower pole is represented by units 1, 2 and parts of 0 and 3 while 4, 5, 6, 7 (Fig 4) stand for the upper pole there being one unit excess on the latter. It is the longer and its forward tilting has been described as a lever like action. This action is much increased when the superior borders of the broad ligaments are sufficiently relaxed

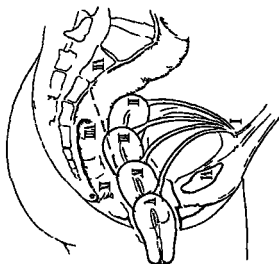


Fig 2—The uterus in backward and downward displacement describes an arc the radius of which is represented by the round ligaments—and the radius of an arc is constant. Their function is to hold the fundus forward and to maintain its even balance in the pelvis

to let the corpus uteri lie upon the bladder for the pressure area of these ligaments is greater behind than in front stress therefore would force the body of the uterus and bladder against the levator muscle and over the vaginal orifice. But when the bladder is distended or when the intestines lie between it and the uterus abdominal pressure is transmitted through them to the anterior part of the uterus then the four units 10, 11, 12 and 13 (exerting a lifting effect) neutralize units 4, 5, 6 and 7 behind the corpus. The lever like action is reversed for pressure in the cul de sac—1, 2 and parts of 0 and 3—carries the lower pole forward and the upper pole moves to the rear. This clearly indicates the use of the round ligaments for without them to hold the fundus in position the difference of pressure favoring forward inclination of the uterus might be overcome easily.

Inspection of Fig 5 discloses the fact that no longer occupying the anterior segment of

It also explains the reason girls and young women with immature development or slight infantilism are so frequently subject to retrodisplacement. And I may add that the lack of development in the body of the uterus results in decrease of pressure area behind the corpus. It coincides with the increase of pressure bearing force in the pouch of Douglas or reversal of normal tilt.



Fig 4 Parts of the uterus exposed to pressure coincide with its peritoneal coverings. Its area on the lower pole is represented by units 2 and parts of 1 and 3 while 4 5 6 and 7 stand for the upper pole there being one unit less on the latter

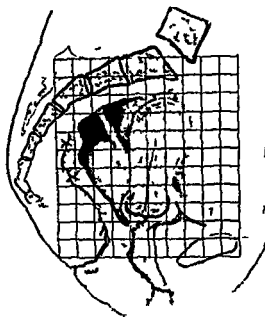


Fig 5 Added to this is the strain of abdominal pressure as indicated by all the units in contact with the peritoneum of the bladder uterus, and Douglas pouch (2 3 4 5 6 and 7) The cumulative effect of these is an overburden in excess of the normal 25 per cent

area is applied directly to the bladder and anterior surface of the uterus as it lies in the hollow of the sacrum. Change in the tissue such as softening from relaxation and venous stasis interfere with nutrition and decrease resistance. The conditions are similar to those of the post puerperal displacement except for the effect produced by infection inflammatory lesions lacerations etc. The mucosa connective tissue and fascia become oedematous glandular secretions increase infection is invited the result is disease of the endometrium glandular proliferation round cell infiltration and hypertrophy of mucosa or perhaps chronic metritis fibrous deposits atheromatous vessels haemorrhage etc. The vagina becomes redundant and is thrown into folds the anterior wall slips down in advance of the uterus and forcing up the trigonum passes beneath it into the ostium vaginae the lateral ligaments of the bladder become relaxed and if the suspensory ligaments are much impaired the neck of the bladder may rotate under the pubic arch in

advance of the developing cystocele. The uterus becomes prolapsed the uterosacral ligaments effaced and the broad ligaments are subjected to excessive pressure. The inferior uteropelvic ligaments are now subjected to greatest strain and the round ligaments can offer no restraint until extrusion of the cervix occurs. At this stage the restraining force preventing extrusion devolves upon the overstretched broad ligaments and the peritoneum and with little effect for the full force of intra abdominal pressure is measured at the vaginal orifice.

The posterior vaginal wall coincidentally with the anterior drops for a short distance but it is retarded by its attachments to the rectum and indirectly by its lateral ligaments when they reach a line between the ischial spines. In this new location they become tense and not being subjected to much pressure act as a check on the descent of this part of the vagina. But on further advance these attachments feel abdominal strain and follow the uterus in its outward passage.

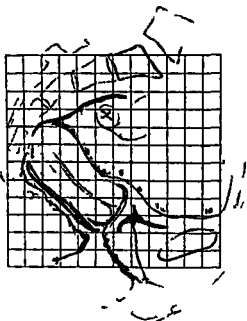


Fig 6 Diagram exhibiting the retroverted uterus. In this position the tubes (3, 4, 5, 6, 7, 8 and 9) cover the entire pelvic peritoneum and indicate the position of the uterus as it is subjected to the maximum strain originating from the abdomen. This strain augmented the erect position by gravitation.

So much for the effects of pressure upon the ligaments of the uterus in ordinary circumstances but now let us turn to the consideration of cases having their origin in lesions of the floor of the pelvis.

The perineum may be likened to the center stone in an inverted arch but in place of a crushing force it sustains a tensile strain. The decussating fibers of the levator ani muscle attached to the anterior surface of the anal segment of the rectum, the rectovesical fascia and the triangular ligament (constituting the most important parts of the perineum) act as a bond holding the two halves of the levator ani muscles together between the rectal and vaginal outlets. Pressure tests show an average of 80 mm in the abdominal cavity 60 mm beneath the cervix 40 mm on the inside of the perineum 20 mm on its external surface before it reaches full distention, and zero when bulging is complete. Therefore it will be observed that the perineum sustains 40 mm of pressure and

actually bears two-thirds of the burden measured beneath the cervix or 50 per cent of abdominal strain. But when the perineum is destroyed pressure tests show full intra-abdominal strain at the vaginal orifice. The reason for this is that the two sides of the levator muscles separate the abnormally large vaginal orifice offers no resistance and the pelvic organs are held by their ligaments and other suspensory attachments only (the support below being removed). Normally the levator muscles draw the perineum forward and beneath the bladder until the posterior commissure reaches the trigonum which covers the outlet like a lid to a box. In lacerations of the perineum this effect is lost. The loose portion of the vesicovaginal septum posterior to the trigonum (that part in which the connective tissue permits the bladder to move easily on the vagina) slips forward and becoming more or less oedematous, passes beneath the trigonum and protrudes from the vagina. As it develops it draws the neck of the bladder and the uterus downward. If the rectal sheath has been torn when subjected to elongation coincidentally with distention of the perineum in labor or if meshing of its fibers has occurred the rectum rolls forward and outward for the lack of perineal support as the thin walls of the rectum are unable to sustain the intrarectal pressure which at times is equal to the abdominal. When dealing with lacerations we must not be unmindful that they are frequently associated with puerperal infection. Inflammatory softening is not confined to the uterus but it involves the ligaments and arrests the process of involution they become relaxed and incapable of supporting the uterus. It lies in the hollow of the sacrum consequently this class of cases frequently begin with retroversion. They however follow a similar course to those described except that changes take place more rapidly and there being a greater relaxation of fascia the rectum is disposed to slip forward in advance of the cystocele.

It is not the purpose of this paper to deal with cases having their origin in new growths and other specific pathological lesions nor is it intended to account for the influence of adhesions to the uterus etc.

EXPERIMENTS ON THE TRANSPLANTATION OF GASTRIC MUCOUS MEMBRANE

BY WILL DOOLIN M.B. F.R.C.S.I. DUBLIN IRELAND

THANKS to the rapid advances made in plastic surgery within the last ten years every day new tissues are becoming serviceable for purposes of free transplantation. At the same time the possibilities of the various tissues for this purpose have been exhaustively investigated by thorough and patient experiments upon the living animal with the result that today we have a very definite idea of the value and the limits of such transplantation in the individual tissues such as fat bone skin etc.

The latest tissue to be investigated in this manner and for this purpose is the epithelium lining parts of the alimentary canal and the ureters which was first utilized as transplantable material by Lever (1) Streissler (2) and Schmieden (3). Lever in 1910 in a case of traumatic stricture of the urethra due to fracture of the pelvis successfully transplanted the sound appendical mucosa of the same patient in place of the excised stricture. Streissler in 1911 in three cases of periscrotal hypospadias used an homoplastic transplant in the attempt to form a new urethra. Schmieden in 1909 attempted in 3 similar cases to form a new passage for the urine with homoplastic grafts of ureteric tissue. Lever would appear to have had at least one satisfactory result. The attempts of the other two workers were either partly failures or else the patients did not remain sufficiently long under observation. Hence it is that from these very few reported cases (not one of which was watched to a definite conclusion) we have no clear knowledge of the procedure which takes place when the mucosa of hollow food carrying organs is transplanted upon new soil. And further in these cases too for obvious reason we have no histological picture which could have given us so much information as to the ultimate fate of the epithelial lining of the newly formed passages. The animal experiments of both Streissler and Schmieden failed to produce any accurate information on the subject.

Axhausen (4) was the first to establish definite experimental proof of the possibilities of transplantation in the gastric mucosa within the abdominal cavity of dogs. His experiments were made in three parallel series to determine the relative values of autoplasmic homoplastic and heteroplastic grafts for the last named rabbits were used. Pieces of the stomach wall were excised the mucosa stripped off washed in sterile physiological saline solution then stretched on the peritoneal covering of either the stomach or urinary bladder and there fixed with catgut sutures in such wise that in alternate cases the mucosa graft was lain either face up or face down on the surface of the organ to which it was attached. The heteroplastic experiments were completely negative in result. Of the other two series twenty six experiments were carried out—sixteen autoplasmic and ten homoplastic.

As regards their condition after implantation in the same or in a second individual the results were strikingly uniform showing in a marked manner the differences between the autoplasmic and the homoplastic grafts. The homoplastic grafts underwent necrosis throughout with the exception of scattered portions of the muscularis mucosae these portions were surrounded by and infiltrated with granulation tissue growing in from the immediate vicinity which was in process of absorbing the necrosed material so that the whole presented the picture rather of a fibrous callus. Of the transplanted vesical mucosa (which possesses no muscularis mucosae) nothing remained at the site of transplantation save a few omental adhesions to remind us that living tissue had been planted there.

Very different were the results attained in the autoplasmic experiments. In every case the mucosal graft had developed into a cyst of greater or smaller size in direct proportion to the length of time which had elapsed since transplantation. The cysts were formed in the following manner. In those cases where



Fig. Experiment 8. Dilation eight days. Mucosa well preserved. Superficial epithelium necrotic. Deeper epithelial layers well preserved and growing out. Mucosa overlayered over necrotic portion of stomach wall. The graft is the pylorus with mucosa face down. Obj. 3 or 50.



Fig. Experiment 8. Dilation 8 days. Pylorus mucosa facing up. No corner of epithelial cell remaining beneath and proliferation angle. The cyst cavity. Obj. 3 or 50.

the mucosa had been planted face down (i.e. with the epithelial surface facing the stomach wall) it had raised itself up from the under layer and so formed one wall of the cyst the opposite wall of the cyst consisting of the stomach or bladder wall upon which implantation had taken place. In the cases where the mucosa had been planted face upward (i.e. with the epithelial surface facing the peritoneal cavity) omental adhesions had grown over the transplanted tissue and in common with it also produced a cystlike structure. All these cysts were tense and filled with fluid.

Of the transplanted mucosa complete layers were thoroughly well preserved conforming in their epithelium gland connective tissue and muscularis mucosa to the normal type of gastric mucosa. Each cyst was lined throughout with a single layer of cubical epithelium derived apparently from the subsequent growth of the transplanted mucosal epithelium.

The questions which naturally arise out of this experimental evidence can be formulated somewhat as follows: (1) Whence does the

surviving graft tissue derive its nourishment? (2) Does the whole of the transplanted mucosa take part in this cyst formation or only a part thereof? (3) And if the latter which part then?

The first suggestion that occurred to us was that the nutrient material was enabled to effect its influence from the free surface of the mucosa upon the transplanted tissue and hence to keep the superficial epithelial cell alive from whence further proliferation might take place or the blood supply to the graft might have come from the site of implantation working its way through the muscularis mucosa and in this way allowing the superficial epithelial cells to die whilst preserving the deeper layers. The decision of this point seemed to us to be essential in regard to the further practical application of these experiments such for instance as the formation of tubular grafts of mucosal tissue in further researches in plastic surgery in such cases then one would naturally be led to turn the epithelial surface of the graft outward if one could establish the fact that the nutrition and preservation of the graft was best accomplished by this means and vice versa.

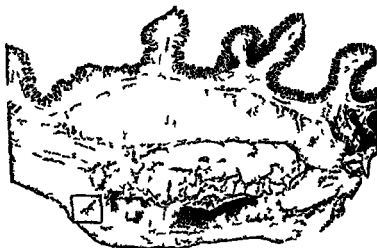


Fig. 3 Enlargement $\times 4$. A low power view of Fig. 2 to show the point of union and the solitary remaining inlet of living epithelium at this point.

Finally there was a third possibility to be taken into consideration viz that at the cut edges of the transplanted piece of tissue rapid union of the graft with its surroundings would have permitted of the earliest possible access of nutrition to the grafted portion. In this case then the mucosal epithelium must possess extraordinary proliferating power to have brought to pass within such a comparatively short space of time the complete lining of the cyst wall as observed in Axhausen's experiments. In addition to the determination of these questions it appeared to us in view of the surprisingly favorable results of Axhausen's experiments of the greatest interest to determine if similar results (i.e. preservation of epithelium and possible cyst formation) were to be attained only in the situations chosen by him (i.e. abdominal cavity) or else if it were possible to obtain these results on implantation of the gastric mucosa elsewhere in the living organism. Only in this manner could a foundation be laid for the practical application of these experiments in man. Since cysts with a complete epithelial lining were observed in Axhausen's earliest attempts even after so short a period as twenty-five days it behooved us to make even earlier interruptions experiments of shorter duration if we wished to determine

the genesis of these cysts. Only in this manner could we accurately determine how much of the graft remained living before proliferation from this remaining portion had obscured the picture.

In our endeavors we used twenty dogs in the following manner. The Axhausen operation was carried out on five and interrupted after intervals of two four six eight and ten days. In these only autoplasmic transplantation was carried out. The procedure was simple and as follows. Morphine and open ether narcosis laparotomy a piece of the anterior stomach wall (about 5 sq cm) was resected in its entirety and the mucosa stripped off this was divided into two pieces of which one was stitched with interrupted catgut sutures face downward at the pyloric end of the stomach and the other fixed similarly face upward at the cardiac end (i.e. with the mucosal surface facing the peritoneal cavity). The wound in the stomach wall was then carefully sutured in three layers (mucosa stitched by continuous catgut suture musculo-serous coats by continuous silk and the whole covered by interrupted silk Lembert's). Laparotomy wound then closed in layers. As each procedure was carried out under the strictest aseptic precautions healing took place by the first intention and



Fig. 4. Experiment 1. Duration six days. Pylorus mucosa facing downward. Affected by the graft and showing proliferation of the graft epithelium growing out in one layer to the cystic duct.

we lost not a dog from peritonitis. With one exception all the transplanted portions attained firm union at the site of implantation in their whole periphery appearing either red or dark grey in color or else brown to black due to hemorrhagic coloring matter. The exception was that of a four-day experiment in which owing doubtless to faulty stitching only one half of the graft had united with the stomach wall. On section there was always between the transplanted tissue and the stomach wall on which the implantation had taken place a cavity of greater or less dimensions to be found.

The first glance through the microscope disclosed a not very hopeful picture. The greater mass of the epithelium and of the muscularis mucosae had taken up none of the staining material and so had to be regarded as necrotic. Numerous red blood corpuscles lay between the gland tubes and likewise numberless white cells had assembled for the purpose of absorbing the dead tissue. Similarly the muscularis was everywhere liberally interspersed with wander cells. In no section however was everything dead. In each alongside the preponderating necrotic areas were some epithelium and some mus-

cularis remaining in a state of preservation varying in extent according to the favorableness of the circumstances in which the graft found itself.

As far as the pyloric (face downward) grafts were concerned we could differentiate two types of tissue conservation. The first type showed the most favorable results (Experiment 1. Duration eight days. Microphotograph 1). Nearly the whole of the muscularis was preserved and above all a very large amount of epithelium notably the deeper layers, the more superficial epithelial cells were necrotic as we are accustomed to seeing in the ordinary skin grafts but the deeper layers were still living and in process of active proliferation. In the accompanying microphotograph one can notice the numerous epithelial gland tubes and observe how from out the depths the epithelium is proliferating and creeping in a single layer over the surface which was for the greater part necrotic. The preparation exhibits a similar process throughout practically its whole extent. Once these strongly proliferating cells effect a union on all sides and grow in from the corners over the opposing stomach wall then the epithelial lining of the cyst is complete. A similar process, if not so perfect was observed in other cases.

In the second type group where less favorable circumstances were evident the muscular coat and the greater mass of the epithelium were dead there being living tissue preserved only at the edges of the graft. And here again one could recognize the marked inclination toward superficial expansion of the epithelium for the purpose of lining the cavity between the grafted tissue and its mother site which cavity on account of the destruction of the large part of the mucosa had attained greater dimensions. As example we take Experiment 8 (duration four days. Figs. 2 and 3) and Experiment 2 (duration six days. Fig. 4).

The section of the four day experiment (see Fig. 3) shows with the low power a complete union with the ground layer only at one corner and it is only at this corner that the



Fig 5 Experiment 4 Duration eight days General picture (low power) of an eight-day cardiac implantation where the mucosa faces the peritoneal cavity. The muscularis is as yet living but the superficial epithelium is completely necrotic save at the corners where it had become adherent.

Here one can observe very clearly how from the island of living epithelial cells a single layer of these cells is growing out and beginning to line the cyst cavity. The same can also be observed in the six day section (see Fig 4). In this latter the same arrangement is to be found at both corners as adhesion had taken place along the periphery of the whole graft. Here too the actual cyst formation is easy of comprehension owing to the vigorous living epithelium and living muscularis to be found while in the cases where the omentum was adherent to the edges of the graft it was only at these spots that living growing tissue was to be recognized. Young connective tissue with numerous fibroblasts formed the hedge between the omentum and the transplanted tissue and the rich supply of capillaries which this connective tissue had formed constituted the active conduit for the blood to the transplanted tissue.

This union of the graft with the omentum therefore is the necessary condition for its preservation and further such union must be a sufficiently rapid one for in the case where coming from the corners the omentum spread later over the surface it came too late to find necrosis already set in as the *vita propria* of the epithelial cells was already exhausted. Hence we can readily comprehend why with the grafts whose mucosal surface was turned outward we never found the

first mentioned type group where almost the whole of the transplanted epithelium and muscularis remained in the living state. In these cases the nutrition carrying omentum could gain no hold on the uninjured epithelial coat. The omentum was found adherent only at the edges of the graft and in every case in this situation. There too wherever omentum was found adherent the grafted epithelial and muscularis cells were found well colored that is living. The later growth of the omentum over the flat surface of the graft came in each case too late to preserve the life of the exhausted mucosa. As an example we take Experiment 4 duration 8 days (see Figs 5 to 8). Figure 5 shows a general picture of an eight day cardiac implantation. Figures 6 and 7 show the two corners with the islets of living epithelium which in Fig 7 can be seen to be in active growth across the surface. As in the other preparations the young connective tissue of omental origin is easily recognizable at the point of junction with the edges of the graft. Figure 8 is also from the same experiment the section has been taken from about the middle of the preparation and shows a flat layer of serosal cells in active growth across the surface of the graft. These two component parts—the living islets of proliferating epithelium at the corners and the omental tissue growing over the surface—constitute with the stomach



Figs 6 and 7 Same experiment as showing high power picture of the corners where the junction with omental tissue of the preservation of cells



Fig 7 the actual overgrowth of the living cell over the necrotic portions can be seen

wall opposite the cyst in the following manner the epithelium pushes in between the stomach wall and the omental layer and lines the hollow space between both layers

If we sum up once more the results of our examinations we find that the transplanted tissue was to be found in a good state of preservation only where firm and rapid union had taken place with the omentum hence this latter must be looked upon as the source of nourishment This necessary adherence of omentum to transplanted tissue appears to take place best at the cut edges of the graft for we find it in this situation in every case without exception Further we always found a marked tendency on the part of the surviving tissue toward expansion in a single layer over the surface and so strong is the proliferating power of the epithelium that the actual preservation of relatively small portions of tissue promised the successful accomplishment of the complete lining of the cavities with epithelium as is to be seen in the longer experiments of Axhausen We are accordingly after our experiences driven to the conclusion that in his cases too the cyst lining developed even out of such small cell rests as our With regard to the practical application of the free transplantation of intra

abdominal mucous membrane i.e. the autoplasmic formation of tubular grafts transplantation with the epithelial surface facing inward alone comes into consideration since in our experience union of the undamaged epithelial coat of an outer mucous surface with the surrounding tissues takes place either not at all or else after so long a time that the transplanted epithelium has already undergone necrosis But even where the mucosa is turned inward it appears to us at least questionable whether the free cut edges of the graft which afford the most speedy adhesion and hence the best route for nourishment on being sewn together to form a tube would not of necessity prejudice this union with the surrounding tissues Further it seemed doubtful to us whether other surroundings such for instance as the soft subcutaneous tissues would have the same powers of nutrition and preservation as the omentum for such a very sensitive tissue as the mucous membrane

To determine the practical possibility of this suggestion we made twelve experiments The mucous membrane was obtained as before and cut into rectangular strips the long borders of which were sutured with continuous silk to form a tube The sites of implantation

chosen for the experiments were the spleen and the subcutaneous tissue of the breast. A way was bored with a broad trocar through this soil the mucous tube implanted and fixed at each end with a catgut suture. (Two of our dogs died shortly after operation from unavoidable internal hæmorrhage.)

The result of these experiments was uniformly negative. There was never even a trace of mucosal epithelium to be found on section. The canal formed by the muscularis mucosæ however was maintained in many cases surprisingly long and well thus demonstrating the much higher resistance of this tissue.

Our attempts in this line therefore do not lead us to expect much from this particular technique in the formation without the abdominal cavity of a tubular transplantation of gastric mucosa. The practical desirability of a successful procedure of this nature occurs to one in connection with the question of some plastic operation for the relief of malignant disease of the œsophagus. We can therefore only explain Lexer's successful transplantation of the appendix in one of two ways. Either that the conservative powers of the mucous membrane are stronger in man than in the animals utilized by us for experiment or else as seems to us much more likely that the appendicular muscularis mucosæ probably preserved the lumen of the tube which was later on lined by the urethral mucous membrane growing down into it.

The actual determination of this point however must remain *in suspense*.

CONCLUSIONS

1. The autoplasmic transplantation of gastric mucosa in dogs is feasible and leads to definite cyst formation.

2. These cysts are lined with a single layer of cubical epithelium arising from epithelial islets which have survived the general necrosis of the graft.



Fig. 8 Shows a 1. layer of acrosal (omental) cells acting growth across the surface of the graft.

3. The graft depends for its nutrition upon the blood supply conveyed to it by adhering omentum.

4. The size of the cyst so formed varies directly with the length of time since the operation.

5. Tubular grafts of hollow abdominal mucosal tissue depend for their success upon their muscularis — the canal being later lined with epithelium growing in from the surrounding.

In conclusion I have to express my gratitude to Professor Doctor George Axhausen of the Surgical Clinic of the Charité Berlin for permission to carry out these researches in his laboratory and to his assistants Dr. Karl Reschke and Eil. Seiffert for much help in the various operative procedures.

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DISLOCATION OF THE SEMILUNAR BONE¹

WITH A REPORT OF EIGHT CASES

BY R. W. RUTLAND, M.D., ANCON CANAL ZONE

THE eight cases comprising the series on which this paper is based were treated in Ancon Hospital and include all of the cases of the past six years. This period covers approximately one hundred and twenty thousand admissions to the hospital which might lead one to believe that dislocation of the semilunar is an extremely rare occurrence. A better index of its relative frequency may be obtained by comparing it with other forms of traumatism. During the three-year period from 1910 to 1912 inclusive about eleven thousand six hundred and fifty traumatic cases were treated and of this number there were sixty-seven dislocations of all kinds, eighty Colles' fractures and six carpal injuries, one half of the latter being dislocation of the semilunar. Codman and Chast² reported a series of twelve cases and called attention to the not infrequent occurrence of dislocations of the semilunar. The cases in this series, unlike theirs, were all recent injuries and it is thought advisable to report them in detail.

Etiology. The population of the Canal Zone is predominantly male and our patients were all adult males. Half of the patients were in their third decade and the remainder were equally divided between the fourth and sixth decades. The youngest was twenty years old, the oldest fifty-four. Five of our patients were black West Indians, two were white American and one was a Spaniard. This is about the relative proportion of the different races. In five instances the left wrist was affected and in three the right. Half of the injuries were due to indirect violence from falls upon the outstretched hand while the others resulted from heavy blows upon the dorsum of wrist.

Pathology. Codman has demonstrated that the articulations above and below the proximal row of carpal bones account for all

of the mobility of the wrist in both extension and flexion and that each group of articulations is responsible for ninety degrees of motion. In either complete flexion or extension the axis of the os magnum forms an angle of ninety degrees to the long axis of the radius while the interposed semilunar forms an angle of forty-five degrees with both bones. In this position the semilunar, at a mechanical disadvantage because only the narrowest part of it is in the axis of force and any increase of the tension beyond the normal has a tendency to squeeze it out of place. This does not occur however except in hyperextension (due probably to the greater strength of the ligaments attached to the anterior horn) and the dislocation is invariably anterior with the concave articular surface of the semilunar facing either forward or downward.

Symptoms. An accurate history of a severe traumatism usually can be obtained and the direction and kind of force determined. The injury almost immediately has been followed by the most intense pain and total disability of the affected wrist. Swelling and ecchymosis rapidly appear. On examination it will be noted that the swelling is very marked and more or less limited to the radial half of the wrist. The fingers are maintained in a position of partial flexion and any attempt to move them causes severe pain. The rigidity of the wrist and fingers is much more marked than in a Colles' fracture of ordinary severity. There is slight ulnar fork deformity. If the swelling is not too great an enlargement can be detected on both the anterior and posterior surfaces of the wrist. The former is the dislocated semilunar under the flexor tendons while the latter is the head of the os magnum made much more prominent by its approximation to the head of the radius. The depression due to the prominence of the

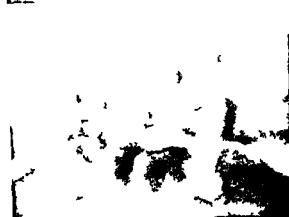
Codman and Chast, *U. S. Army Pub. H. 905.*

Codman, *Boston M. J.* 1901.

From the Department of Surgery, U. S. Army, Ancon Hospital, Canal Zone.



Case 2 Upper picture August 14 1911 lower picture February 8 1912



Case 3 December 4 1911

lunar from its normal position. The apparent shortening of the palm on the affected side upon which Codman and Chase place so much reliance in diagnosis we have not noted. This probably was due to the fact that all of our cases were recent and the condition if present was obscured by the swelling or it may be that the atrophy from disuse in long standing dislocations accentuates the condition making it much more noticeable than in recent injuries.

Diagnosis The provisional diagnosis in a great majority of the cases will probably be Colles' fracture. It requires a very careful examination to exclude Colles' fracture but it will be found that the relative positions of the radial and ulnar styloids remain unchanged there is no crepitus unless there are complication. The circumference of the affected wrist is increased but this may be due entirely to the swelling. The combination of marked swelling spasm and prominences on both anterior and posterior surfaces of the wrist slight silver fork deformity

with no change in the position of styloid processes furnishes sufficient data to make a diagnosis. To obtain accurate information of the condition present to exclude a Colles' fracture and to ascertain definitely that there are no other fractures or dislocations present requires an X ray examination and upon this the ultimate diagnosis must depend. The X ray examination should include several views both anteroposterior and lateral as a dislocation may be overlooked in the former.

Prognosis Judging from the limited number of cases we have had under observation the ultimate result in any given case is difficult to forecast. Much will depend upon the kind of injury and whether there are complications. A Colles' fracture is the most severe complication that we have seen and has always resulted in partial disability. Without gross complicating factors and other things being equal it seems that dislocation



Case 4 March 93



March 93

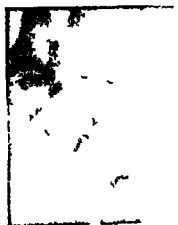


May 7 1903

resulting from indirect violence are much more favorable than those caused by direct trauma. This is due no doubt to absence of severe tendon injury which is always present in those cases resulting from blows upon the dorsum of the wrist. Prompt diagnosis and the early administration of proper treatment of course increase the probability of a good result. Perfect functional recoveries are not common though a fairly serviceable hand can usually be obtained with proper treatment.

Treatment. We have attempted closed reduction in the seven simple dislocation and

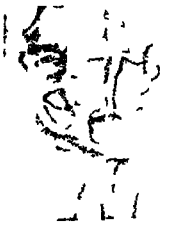
have been successful three times. The method of reduction which we have employed is the same as that recommended by Codman and Chase and consists of traction upon the hand and hyperextension of the wrist and while counterpressure is made over the dislocated bone on the anterior surface of the wrist the hand is brought over into complete flexion. Should this procedure fail it is necessary to cut down upon the semilunar and either reduce or excise it. Of the five open operations two were reductions and three were excisions. In no case have we



Case 5 March 4 93



March 4 93



April 93



Case 6 October 3 1913



Case 7 June 23 1913

excised any part of the scaphoid. An anterior incision between the flexor tendons of the wrist has never been used in all instances.

CASE 1 G M Barbadian age 21 injured by falling down hill and striking upon outstretched hand January 2 1908. Admitted to hospital the next day and was found to have a compound Colles fracture and a dislocation of the semilunar. One week later the semilunar was removed and the reduction of the fracture attempted. This was only partly successful and he was discharged three months later with marked impairment of all movement of the wrist.

CASE 2 I C Spruward age 35 entered hospital February 1912 had been injured the day previous by being struck upon the dorsum of wrist with a heavy dump bucket. The X-ray examination made the day after admission showed a dislocation of the semilunar with its concave surface directed downward and forward and a fracture of the scaphoid. Closed reduction March 4 1912. X-ray made on March 30 and August 14 1912 show that the semilunar had been reduced and in the latter photograph the scaphoid seems to have united. The result in this case was poor. The result in the first case of both flexion and extension.

CASE 3 A H white American age 37 On December 4 1912 had been struck on dorsum of wrist with a heavy piece of timber. X-ray taken on the same day immediately after admission shows a fracture of the ulnar styloid and a dislocation of the semilunar with the concave surface facing downward. Two days later closed reduction attempted but was not successful. An open excision of the semilunar was performed on December 10 1912. Was discharged from hospital three months after the injury and had only about one half the normal amount of motion in the wrist. He was able however to return to his occupation that of a structural iron worker.

CASE 4 F I Barbadian age 20 admitted to Hospital March 3 1913. On the day of admission some heavy machinery had fallen on the back of the hand on dorsum of wrist. X-ray made ten days later showed a fracture of the scaphoid dislocation of the semilunar and a fracture of one of the distal carpal bones probably the os magnum. Failure of reduction March 6 1913 was followed two days later by an open reduction. X-ray examination on May 1st shows that the semilunar had been reduced but that the scaphoid had not united and that the fragment of the os magnum previously not displaced had been displaced posteriorly during the operation. The patient was



Case 8 April 8 1914

discharged one week later and at that time had marked limitation of motion in wrist. Several months later he had but the slightest impairment of function.

CASE 5 P. C. Jamaican aged 27 admitted March 28 1913. Injury received the day of admission by falling off of steam shovel striking on extended right hand. X-ray made immediately showed an uncomplicated dislocation of the semilunar with concave articular surface facing almost directly downward. Closed reduction on April 10 1913 and X-ray of same date showed semilunar in place. This patient was discharged ten days later at his own request but against advice. The result was perfect there being no limitation of motion in any direction and he returned to work as a laborer.

CASE 6 L. G. Jamaican age 6 admitted immediately following injury September 7 1913. While running striking upon extended left hand. X-ray of the same day confirmed the diagnosis of Colles fracture but the dislocation of the semilunar was not recognized until two weeks later when another picture was made. Closed reduction being impossible an excision was done October 6 1913. The head of radius could not be held in position very well. Function of wrist was so limited that passive motion and rather was given. October 20th and again on November 10th. Discharged three weeks after the last operation with very limited motion in wrist.

CASE 7 J. B. white American age 53. Injury by falling on extended left hand June 23 1911. Entered hospital the same day and the X-ray revealed a fracture of the scaphoid and a dislocation of the semilunar with concave articular surface directed downward. Three days later closed reduction was done. Patient was discharged one month after injury at which time he had a perfect functional result there being no limitation of motion in any direction.

CASE 8 A. B. Martiniquan negro age 54. He was injured by a bar of iron falling upon dorsum of wrist March 26 1914. He entered hospital the same day. The X-ray machine being out of order it was impossible to have an examination made until April 8 1914. Dislocation of the semilunar has been the provisional diagnosis and this was confirmed by the X-ray. There was no other injury to the bony structures but there was marked contusion of dorsum of wrist. Three days later an open reduction was done after an unsuccessful attempt at closed replacement. He was discharged seven weeks after injury. He had slight limitation of flexion and marked limitation of extension but there was no interference with either adduction or abduction.

SUMMARY

In this series there have been two uncomplicated cases of dislocation of the semilunar. The first of these (Case 5) was reduced without open operation four days after its occurrence and a perfect functional result was obtained. In the other (Case 8) it was necessary to perform an open reduction sixteen days after the injury and the present result is poor. The marked difference in the results in these two cases would seem to be due to the difference in the kind of force causing the injury. In the former the injury was due to indirect violence in the latter there was a severe tendon injury caused by a direct traumatism to back of wrist. The operative interference necessary in the latter case could hardly have caused the difference for there is scarcely any limitation of flexion the disability being entirely due to loss of extension. The delay in the treatment of the injury may have had its share in increasing the loss of function.

There were two cases of dislocation of the semilunar complicated by fractures of the scaphoid. They both were promptly recognized and closed reductions were done yet the ultimate results were very dissimilar. The first (Case 2) was a poor result even though the X-ray shows that there is appa-

rently good union of the scaphoid in perfect position. The second (Case 7) is one of the two perfect results in our series. Unless the form of violence causing the injury is the determining factor in the ultimate result it is difficult to explain such diametrically opposed terminations in these two cases which were in every way counterparts of each other.

The two cases complicated by Colles fractures were the poorest results that we obtained. One (Case 1) was a compound fracture the other (Case 6) a simple fracture. In both the semilunars were excised. I believe that the poor results obtained were due to a combination of the fracture and the excision. In the first case it probably would not have been possible to treat it in any other manner than that which was used but I believe that the second one might have been improved materially by open reduction of the semilunar and fixation of the displaced styloid process of the radius by means of a small nail or pin. We were unable to retain this fragment in good position by any other means but had it been fixed it would have been possible to use passive motion as we have done in the uncomplicated cases.

In the only case complicated by fracture of more than one of the carpal bones (Case 4) a good functional result was obtained ultimately in spite of the fact that the scaphoid did not unite. The displacement posteriorly of the small fragment of the os magnum apparently did not affect the outcome.

The remaining case of our series (Case 3) was complicated by a fracture of the ulnar

styloid. It was impossible to reduce the dislocation without an open operation. Reduction could be accomplished by an incision but the semilunar had a tendency to redislocation so that an excision was done. This resulted in a fairly serviceable hand although flexion and extension were limited to about one-half of the normal.

Grouping the cases according to the method of treatment it will be noted that of the three closed reductions two were perfect and one was poor of the two open reductions one was fair and the other poor. The three excisions resulted very poorly in two instances and only fair in the other.

CONCLUSIONS

- 1 Careful examination of all carpal injuries and multiple X ray plates are necessary for diagnosis.

- 2 Closed reduction can be accomplished in about one-half of the recent cases by the method of hyperextension followed by flexion while counterpressure is maintained over the dislocated semilunar.

- 3 Prompt diagnosis and treatment are essential in obtaining good results. The more speedily the dislocation is recognized and reduced the better the result.

- 4 Closed reduction should always be tried irrespective of the length of time the dislocation has existed.

- 5 Closed reduction being impossible an anterior incision should be made and the dislocation reduced. Failing in this it is necessary to excise the semilunar but excision should be done only as a last resort.

BENIGN TUMORS OF THE STOMACH

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THE last few years have been so much attention directed toward the study of malignant tumors of the stomach that the benign form has been somewhat neglected. In the preparation of this paper we have endeavored to review the world's literature on this subject which has appeared during the last fifteen years. The extreme rarity of the reported cases surprises and many clinicians will experience has never observed a case in either a living person or one on the post-mortem table. At the present time with our advanced ideas of the chemistry of the stomach with our knowledge of gastroscopy in our observations with the roentgenoscope and with surgical anatomy making it possible to explore the stomach surgically with a minimum degree of hazard it is to be expected that many more cases of benign tumor of the stomach will be reported from time to time. The importance of distinguishing between benign and malignant gastric neoplasms cannot be too much accentuated for such a necessity arises in the stomach should always be treated with surgical conservatism and radical resection has doubtless been performed many times where the character of the tumor did not require such a hazardous procedure.

It is interesting to note that the diagnosis of benign tumors of the stomach has rarely if ever been made before operation. They have usually been discovered as an incidental finding or at autopsy. Some idea of the rarity of the disease may be obtained by the fact that Alfred Tilger (quoted by Meyer) in thirty-five hundred necropsic reports but fourteen benign tumors of the stomach. In the Obuchow Krankhaus in seventy-five hundred necropsies four cases of polyps of the stomach were found. In the Russian hospitals Tilger found the percentage to vary from 0.07 to 0.4 per cent. Vegde in 1908 reported one case of polyadenoma and in a search of recent German and English literature was able to find a treatment of

this subject in the works of Collier, Harter, Letourneau and Collard. In French literature Menetrier, Briard and Norman have each reported cases.

These tumors may develop in any part of the stomach and may form on either the inside or the outside of the wall varying in size from a pea to a baby's head. They may arise from any of the three coats of the stomach and may be either sessile or pedunculated at times imitating carcinomas or sarcomas. Clearly that they cannot be differentiated except through most careful pathological examination. Some of them even resemble with characteristics that mislead malignancy. The majority of cases occur in elderly people although they may be found in younger individuals.

There are a number of different benign tumors associated with the stomach. Among them the most important of these may be mentioned the myxoma, fibroma, lipoma, lymphadenoma, and lymphadenoma. Other tumors which may be found are the myxoma, teratoma, by fibroadenoma, sarcoma, leiomyoma, and angiosarcoma and epithelioma. The myxoma is a common form of benign tumor of the stomach and about fifty cases have been reported. Most of these cases have been proved to be malignant however it is fibrosarcoma, myxosarcoma, and leiomyosarcoma. Myxoma may be single or multiple and is usually situated in the pyloric region forming firm rounded tumors with a thin pedicle. They vary in size from a pea to a cherry and are composed of non-infiltrated muscular fibers arranged in a concentric manner held by a thin mucous membrane.

Fibromata are found in the submucous coat of the stomach. They may be the size of a fig or a egg and will cause trouble although they have been known to separate the muscular wall and form tumors of considerable size beneath the serous investment of the stomach. Occasionally they originate

in the subserous connective tissue and may become very large and troublesome because of the mechanical displacement of the stomach. The lipomata are usually single and are found in the median portion of the stomach on the anterior wall. They are soft lobulated tumors of yellow color and with short thick pedicles. The tumor itself consists of fat with fibrous tissue covered by mucous membrane. They rarely become malignant.

The fibromata like the myomata are usually found in the pyloric portion of the stomach and are either single or multiple. They are elongated and as a rule measure several inches in length. Microscopically they may consist either of fibrous tissue or may be of a papillomatous nature. The myomata and fibromata are of interest because of the frequency with which areas of sarcomatous degeneration may be found. This may lead to a question as to their classification as benign tumors. However the condition is usually limited and their progress is neither rapid nor extensive.

Fibromatosis of the stomach has been the subject of an exhaustive discussion by Thompson and Graham. These writers claim to have cleared up a long standing controversy as to whether fibromatosis of the stomach is innocent or malignant finding that in some cases it is innocent and in others it is associated with cancer. They say that the condition known as fibromatosis may be limited to a portion of the stomach or that it may extend throughout the entire stomach. The localized form almost always commences in the vicinity of the pylorus and spread from there toward the cardiac end usually showing a preference for the lesser curvature. In the majority of cases that were examined there was situated at about the center of the affected area a deeply punched out ulcer. Special attention was devoted to the muscularity of the stomach and Thompson and Graham early suspected that a breach of the mucosa would be an antecedent of fibromatosis. Some authorities have suggested that fibromatosis is of yphilitic origin but the majority of these cases show a negative Wassermann reaction. Thompson and

Graham affirm most positively that fibromatosis may occur without the presence of cancer although they note a most striking association which exists between it and ulcer. They have not seen fibromatosis in a stomach that was otherwise normal and maintain that the changes in the mucosa are primary and that the fibromatosis is secondary.

A group of tumors which are of frequent occurrence are the adenomata. Pedunculated adenomata when solitary may reach a large size and may be either round or smooth and lobulated. They are usually attached to the stomach in the pyloric region. When multiple these tumors are not large and vary in size from a pea to a nut. The growth is rather firm and may contain several small cysts filled with mucus. Microscopically there are found tubular glands supported by connective tissue and liberally supplied with blood vessels. It is difficult to make definite limitations between simple adenomata and adenocarcinoma since the structure may be very similar in the two cases and death may result before the formation of metastases. In fact it is also possible for a simple adenoma to take on malignant characteristics and excepting possibly lipomata there is probably no other benign tumor of the stomach but what may become malignant. The polyadenomata are the tumors most frequently found to be of benign character. They are usually multiple and as many as two or three hundred have been found in the fundus and middle of the stomach near the greater curvature. As a rule the tumors are distributed evenly over the stomach or they may be arranged in rows running parallel to the long axis of the stomach. The tumors are usually globular or lobulated although they may be elongated. They vary from the size of a pea or bean to that of a nut. The color varies from pink to brownish gray. They are soft and spongy and contain considerable mucus. The center of the tumor consists of connective tissue continuous with the submucosa of the stomach and containing lymphatics and blood vessels and over this a layer of non striated muscular fiber representing the muscularis mucosa. The bulk of the tumor is made up of greatly

given rest in bed for a month that she be kept under observation by her family physician and that because of her anæmic condition she should be given iron and arsenic hypodermically and her nutrition be pushed to the maximum.

In one month she returned with practically no change in her condition and we sent her to the hospital for further observation. Another week passed and we were unable to make a positive diagnosis. She returned home and consulted us again in December 1913. At this time Dr. William Northrup was called in consultation and asked to make an analysis of the blood urine and fecal excretions. He reported the same findings as we observed at the previous examination except that he found a small quantity of blood in the patient's stool and in the stomach contents. These combined findings suggested to us liver disease, gastric ulcer, duodenal ulcer or malignant disease of the stomach. Dr. Northrup made a probable diagnosis of papilloma of the stomach and advised an exploratory laparotomy.

The patient was properly prepared by stomach lavage, thorough catharsis and the administration of liquid nourishment for twenty-four hours before operation. Patient was given ether anesthesia and an incision was made slightly to the right of the median line extending a short distance below the umbilicus. Nothing abnormal was found after a most careful search of the viscera excepting a small apparently movable tumor larger than a pigeon's egg situated on the posterior wall inside of the stomach near the greater curvature about four inches from the pylorus. Finding no other cause for her trouble we incised the stomach and removed a papillomatous growth about the size of a pigeon's egg. The pedicle was small about half an inch long and permitted of considerable movement of the tumor. It was a simple matter to remove it and cauterize the stump. The stomach was closed with three layers of sutures and there was very little hemorrhage. The patient made a satisfactory and uneventful recovery. She vomited a small amount of blood after operation which was probably due to the manipulation necessary to a thorough examination of the stomach before and during the removal of the tumor.

So far as we are aware this is the first case of papilloma of the stomach that has been operated upon where an almost positive diagnosis of the case was made before operation. It is rather unusual for a papilloma situated in this part of the stomach to cause the symptoms from which this patient suffered. It is now nine months since the operation was performed and since that time she has never had any pain or any other symptoms referable to the stomach.

We assume that the tumor in this case was

benign because there were no evidences whatever of metastases and because these tumors are usually of benign character also because nine months have elapsed without any evidence of recurrence of the tumor. However a pathological examination of the specimen was made by Dr. Warthin, who reported that the growth was a papilloma on an adenocarcinomatous base. We will keep the patient under observation and time will tell whether the tumor was benign or malignant in type.

The case has been a very instructive one to us and has stimulated us to consider the possibility of the existence of benign tumors in obscure cases of gastrointestinal disorders associated with the presence of occult blood in the stool. It has also drawn our personal attention to the fact that in operating upon tumors of the stomach one should bear in mind that while benign tumors of this organ are rare they are not so rare but that they should be given grave consideration in deciding upon the surgical procedure that will conserve the best interests of the patient.

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study of the secondary deposits which are easily accessible to observation namely those in the skin and bones showed me that these secondary deposits commencing near the primary growth spread in a *centrifugal* manner from it

TABLE SHOWING THE FREQUENCY OF CANCEROUS DEPOSIT OR SPONTANEOUS FRACTURE IN 320 CASES OF MAMMARY CANCER AT THE MIDDLESEX HOSPITAL, 1872 TO 190

	Bone	Number of Cases	Percentage of Total
Bones lying wholly or partially within the area liable to subcutaneous nodules	Sternum	30	9
	Ribs	8	2
	Clavicle	5	1
	Spine	3	1
	Cranial bones	9	3
	Scapulae	4	1
	Femur	4	1
Bones lying beyond the reach liable to subcutaneous nodules	On sternum	9	3
	Humeri	9	3
	Raden		
	Ulna		
	Thib		
	Volu		
	Patella		
Bones of hand			
	Bones of foot		

This bone owing to its shape is not much liable to spontaneous fracture and rarely comes under observation at an autopsy

Knee skeleton femur affected in its whole length with stension of growth: patella and hand of bone

Note that while in extreme cases this centrifugal spread may involve the greater part of the area of the body the arms below the elbows and the legs below the knees are never the seats of such deposits Yet it is in the distal extremities above all other places that we should expect to find evidence of embolism

How could this extensive centrifugal spread be accounted for? I began to make microscopic sections of long centrifugal strips of the skin and subcutaneous tissues radiating from the primary growth In them at points near the growth isolated nodules of secondary growth could be seen Farther out at a varying distance up to ten inches from the primary growth I found a narrow and elusive zone a few millimeters wide where the lymphatic vessels were choked by cancer cells Beyond it the tissues were normal This zone was met with in each of my radiating strips and it constitutes the true growing edge of breast cancer It may be found at any distance up to two feet from the primary growth The detection of this microscopic growing edge is the foundation stone of the permeation theory of dissemination

These facts can only be explained as follows

The immense proliferative pressure of the epithelium at the primary focus forces cancer cells into the small lymphatics along which they grow in continuous lines This process which I have called permeation is the master process of dissemination

Reaching the lymphatic plexus into which the breast in the first instance drains permeation involves a larger and larger circular area of this plexus filling up its channels with lines of cancer cells and sending offshoots into the adjoining muscular and cutaneous layers Sooner or later cancer cells are thus brought into the serous cavities and rapid visceral dissemination rings down the curtain

You may ask If permeation has so much importance how could it so long escape observation? The answer is that it is a fugitive process that the permeation of a lymphatic is followed by a curative process which obliterates the lymphatic and destroys the cancer cells contained in it The track of a forest fire is easy to follow but permeation in its continuous slow centrifugal spread leaves behind it only an almost undetectable network of fibrosed lymphatics and an occasional isolated secondary nodule where the protective process has failed Cancer then must be conceived of as a gigantic ringworm of permeated lymphatics situated in the plane of the deep fascia

The main operative principles deduced from the permeation theory are First the area which demands widest removal is that in which the growing edge is situated namely the deep fascia in which is found the lymphatic plexus which forms the highway for the spread of the disease Second the area of deep fascia removed must be roughly circular in outline since permeation spreads with approximate equality in all directions from the primary growth Third the primary growth must always be the center of the area of fascia removed Failure to observe this rule accounts for many recurrences Fourth the skin and muscles being secondarily involved over a smaller area and less widely than the fascia the removal of a smaller area of these tissues will suffice The removal of the embolically invaded regional lymphatic glands is of course essential

BILATERAL CONGENITAL CAPUT OBSTIPUM

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A NUMBER of theories have been advanced to explain cases of congenital wry neck or caput obstipum. Generally, of course, the familiar deformity—inclination of the head to one side with rotation toward the opposite side—is due to shortening of one of the sternomastoid muscles, but as to what causes this shortening there is a difference of opinion. Very frequently infants which present the deformity have been delivered by some operative procedure, notably by breech extraction (Gauss) and therefore are thought to have suffered a birth injury. This no doubt is often true. According to Stromeyer, Witzel and others, the most common cause of congenital wry neck is a partial or complete rupture of the sternomastoid muscle which has healed with subsequent contraction of the cicatrix.

Birth injuries, however, do not explain all cases of congenital wry neck, and in not a few instances the antenatal existence of the abnormality must be assumed. This view, expressed in 1670 by H. Van Roonhuysen, has recently gained much sound support. For example, it has been shown that congenital wry neck may be associated with other fetal deformities, as harelip, club foot and luxation of a joint, and this association indicates that wry neck may be due to an error in development. The occurrence of this deformity of the embryo in cases of tubal pregnancy also demonstrates that it may arise in consequence of faulty development. Thus, Joachimsthal has described the case of a four and one half months extra uterine pregnancy in which the foetus presented typical right-sided wry neck, as well as double club foot, deformed fingers and toes, and a deformity of the head. Similar cases have been recorded by Czerny and others. Furthermore, the well known occurrence of wry neck in mother and child indicates that the deformity may be inherited. Hereditary transmission has been

observed by Dieffenbach, Pfesfer and Joachimsthal, and in none of these cases was there a possibility of injury at the time of birth.

Occasionally adhesions between the amnion and the face of the embryo bring about a position of the head which interferes with the development of one of the sternomastoid muscles. This hypothesis has been elaborated by Petersen, who holds that when one side of the face adheres to the amnion the body of the embryo falls in the opposite direction. Consequently the development of the sternomastoid muscle on the side where the adhesion exists is not interfered with, but the points of insertion of the opposite muscle are brought nearer together and this influence tends to the production of wry neck. Petersen accepts the teaching of Ahlfeld that amniotic adhesions occur more frequently on the left side of the embryo, and predicts that in these cases the right sternomastoid will generally be the muscle affected.

Other mechanical factors which tend to disturb the normal relation of the head and body of the foetus have been suggested as a cause of caput obstipum, but most of these suggestions have been offered to explain isolated cases and are not of wide application. Thus, Busch found tilting of the pelvis a satisfactory explanation, and Meinhard Schmidt regarded the pressure of the mother's liver upon the pregnant uterus as sufficient to explain the wry neck of an infant which presented by the breech. From his experience Schmidt concluded that conditions which favor the deformity include breech presentation, pelvic contraction, primiparity and a small amount of amniotic fluid.

Several authors who accept the view that caput obstipum frequently develops *in utero* and is due to an unnatural compression of the foetus prefer to explain the change in the sternomastoid muscle not by a cramped position, but by some interference with its blood-supply. Volcker, in particular, has ad-

vocated the ischæmic hypothesis and has demonstrated degenerative changes in the muscle which he considers may be explained in no other way. Koester also accepts this explanation for his case in which the diseased muscle was 2.5 cm shorter than the healthy one and was replaced almost entirely by fibrous tissue. Similar explanations have been given by Schloesmann, Zimmermann, Couvelaire, Durante, Fridberg and Rettig.

On the other hand, Volkmann has found changes in the muscle which in his opinion may be interpreted only as the result of an inflammatory process. Mikulicz also has described a case which he thought due to a true inflammation designated fibrous myositis. It was accompanied by hyperplasia of the lymph glands. Subsequently from the same clinic Kader published cases ascribed to hæmatogenous infection. While the accuracy of these observations can scarcely be questioned, they are probably exceptional. In such instances the possibility of an umbilical cord infection and of an injured sternomastoid muscle representing a *locus minoris resistentiæ* must not be overlooked. Otherwise it is difficult to understand why one and not both of the sternomastoid muscles was affected. Indeed most of the hypotheses offered to explain congenital wry neck are applicable only to cases where deformity is limited to one side. And while unilateral cases greatly predominate, double congenital wry neck is a possible though very rare deformity. An instance of the latter kind has recently been observed in the Woman's Clinic of the University Hospital and inasmuch as the mother was delivered at the onset of labor by cesarean section there can be no doubt that the deformity of the infant existed during intra-uterine development and was independent of birth injury.

P. J. Russ and Jewess: 1 para 21 years old pregnancy normal. *Pelvic measurements*: Pines 22 cm, crests 26 cm, trochanters 29.5 cm, external conjugate 17 cm, diagonal conjugate 11.5 cm, bituberal 9 cm, anterior asgital 4.5 cm, posterior sagittal 7 cm. *Diagnosis*: Generally contracted, funnel pelvis. *Labor* began September 10, 1913 at 5 P. M. The poorly flexed head was floating in the left occiput posterior position. Fœtal heart sounds were distinct in right lower quadrant 140 to minute. The round

ligaments were parallel indicating a posterior attachment of the placenta. Uterine contractions were infrequent and not severe until 8 P. M. when a vaginal examination revealed the following: Cervix dilated 3 cm, canal obliterated. Brow presenting with large fontanelle to the right and anterior. An elbow had prolapsed posterior to the head. At this examination the membranes were ruptured accidentally. A very small amount of amniotic fluid escaped, not more than 100 cc.

Several methods of delivery were considered. On account of the danger of prolapse of the cord, manual dilatation of the cervix followed by version and extraction did not seem to offer a favorable outlook for the child. And if manual dilatation of the cervix were performed, the almost certain occurrence of deep cervical lacerations would have made pubiotomy inadvisable in the event of serious pelvic resistance. Consequently cesarean section was selected and the classical operation was performed. The uterine cavity did not contain any amniotic fluid. Convalescence was uneventful. The child, a male, weighed 3,180 gm and was 49 cm long. The measurements of the head were: O 13.0, C 12.5, S 10.5, B 1.5, P 10.25, B 1.5, F 7.5, S 10.5, C 12.5. Shoulders Circ 32.5 cm. The child was slightly asphyxiated but was quickly resuscitated by the use of hot and cold tubs. It held its head persistently in marked extension so that the occiput was almost in contact with the interscapular region. Evidently the notable extension of the head existed before birth and probably explained the prolapse of the arm.

During the four weeks the child remained in the hospital, it continually held its head in marked extension. It could not nurse satisfactorily unless the head was thrown back; it breathed more easily in this position and whenever the head was forced into flexion the infant seemed very uncomfortable. Removal of the force was promptly followed by a return to the unnatural extended attitude.

After discharge from the hospital the mother left the city and did not return for nine months. Upon request she then brought the infant for observation. Development it was found, had proceeded normally and the head was now held in a perfectly natural position. The mother stated that the infant had continued to hold its head back until it was four months old when the natural attitude was assumed. She attributed the cure to the systematic massage of the neck she had performed.

At first we ascribed the extremely retracted position in which the infant originally held its head to the fact that it had been a brow presentation but as there was no tendency to assume a normal attitude we searched for some other tangible cause. However there was no tumor of the neck and radiographs showed that the thymus was of normal size. An X-ray photograph of the spinal

column taken a few days after the infant was born represented the spinous processes of the second and third cervical vertebrae so closely approximated that a fusion between these structures was suspected. But a later radiograph showed a normal vertebral column. Furthermore there was no clinical evidence to indicate that the infant was suffering from an infection. Its temperature did not rise above normal and there was no nutritional disturbance.

Although several hypothetical explanations for the persistent extension of the head suggested themselves all could be ruled out except one which assumed that there was shortening of both sternomastoid muscles. These structures could be more distinctly palpated than in normal infants of about the same age. Therefore the question arose as to whether spasmodic contraction of both sternomastoid muscles would produce such a deformity as was present in the case. And as conflicting evidence was offered by several anatomical authorities which were consulted this question was submitted to experiment.

A recently delivered stillborn but not macerated infant was dissected. Both sternomastoid muscles were exposed and carefully separated from the contiguous tissue. An assistant then held the cadaver in a horizontal position supporting the head in the normal attitude and so as not to prevent movement either forward or backward. Now by means of an artery clamp each of the exposed sternomastoid muscles was seized about its middle point and traction made upon the mastoid processes. Slight backward rotation of the head occurred. Repetition of the experiment was always followed by the same result.

The following supplemental experiments also were made. Heavy silk sutures were fastened upon each mastoid process at the point of insertion of the sternomastoid muscle. They were brought downward approximately in the course of these muscles and were passed beneath the sternocleidocranial joint. The lower end of the sutures were left free. Again the cadaver was placed in the horizontal position just described. The lower free end of the sutures were seized and traction made upon the mastoid processes.

As in the the previous experiment the head swung backward and even to a more notable degree for strong traction upon the sutures brought the occipital region of the head directly against the interscapular region. This position was the same that had been noted clinically and thus the experiments demonstrated that the extreme extension observed in our case could be explained by the action of the sternomastoid muscles. Furthermore as other possible causative factors had been excluded this clearly was the correct explanation.

A similar deformity has been described by Hildebrand and so far as we have been able to ascertain, that is the only other case of bilateral caput obstupum which has been recorded. The infant was delivered by the breech and as the birth was spontaneous Hildebrand considered that the possibility of injury could be excluded. However the delivery of the head was delayed and the infant was slightly asphyxiated. At first no deformity was present but when four weeks old the infant began to hold its head backward. Small hard tumors were then felt about the middle of both sternomastoid muscles. They were not adherent to the skin. The infant was operated upon and at the operation the tumors were found buried in the muscle. A few weeks later the child died of inanition and bronchopneumonia.

Sections showed a marked decrease in the muscle fibers in the region of the tumors, though many fibers still remained and there was no doubt that functional activity had persisted. No blood pigment could be demonstrated and therefore the tumors were judged not to be organizing hematomata. The pathological diagnosis was interstitial myositis. With regard to the cause of the lesion the author concluded that it could not be explained by any process with which we are at present familiar.

The position in which the head was held in Hildebrand case which was identical with that noted in our own he attributed to the spasmodic contraction of the sternomastoid muscles. These muscles he said arise from the mastoid processes and from the cervical line behind the latter and

because their principal origin lies somewhat behind the joint (the occipito atlantoid) the extreme extension is clearly explained. Naturally it will be most marked when the posterior portion of the muscles is that chiefly involved in the contraction.

The primary factor in the shortening of the sternomastoid muscles in our case could not be definitely ascertained. However it is certain that amniotic adhesions were not involved in the process and as the deformity disappeared in a few months it is equally certain that no permanent defect in the development of the muscles existed. An inflammatory affection also may be ruled out. The most reasonable explanation for the shortening of the muscles it would seem was the partially extended position the foetal head occupied in *utero*. This in turn was referable to the pelvic contraction of the mother and the restriction of foetal movement in consequence of a relatively small amount of amniotic fluid.

Long-continued extension of the foetal head and as a result the approximation of the points of insertion of the sternomastoids, must interfere temporarily with the growth of these muscles or at least with their functional activity. The experiments which Heller has made upon dogs prove that muscles ultimately shorten whenever their points of insertion are permanently brought near together. Similar conditions are imposed upon the sternomastoids by extension of the head and the effect of this position must be commensurate with the duration of the enforced attitude. In our case the subsequent history demonstrated that the position had not been maintained long enough to produce irreparable muscular degeneration. Nevertheless the changes were sufficiently severe to delay the correction of the deformity until somewhat later in infancy than usual. In the case of infants delivered in face presentation for example the retracted attitude of the head usually disappears in a few days.

The relatively long persistence yet spontaneous correction of the deformity its independence of birth injury and therefore the support given the view that wry neck is not always of traumatic origin and the

demonstration of the action of the sterno mastoid muscles in extending the head are facts worthy of clinical emphasis.

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 KRAUZE Über die Localisation des K. pfnickers beim muskulären Schiefhals, nebst Bemerkungen P. thologie dieses Leidens Zentralbl f Chir 1895 No
 PETERSEN Caput Obstipum Zur Aetologie und Behandlung Arch f klin Chir 884 xlv 78
 JORDAN Über die angeborenen muskulären Schiefhals Arch f klin Chir 90 xlv 797
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 PFLIFFER II Zur Aetologie und Therapie des Caput Obstipum Musculare Dissertation B. ri 900
 RETTI Über Caput Obstipum Musculare Dissertation II B. ri 900
 V. ROOYEN Quoted by Joachimssthal Handb d orthop Chir I Part 44
 SCHLOZMAN Die Entstehung des angeborenen muskulären Schiefhalses Beitr z klin Chir p 7
 SCHMIDT Zum Kapitel des Schiefhalses Zentralbl f Chir 1900 xlv 570
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 WITTEL O Über die Entstehung des sogenannten angeborenen muskulären Schiefhalses Arch f Gynäk 1891 xl 4
 ZIMMERMANN C Klinisch Untersuchungen über traumatische lastungsdeformitäten am Kopf und Schädellagen Kindern Dissertation Freiburg 191

A SERIES OF FILIFORM APPENDICES¹

By H. K. DONN, M.D. INDIANAPOLIS, INDIANA

By a filiform appendix is meant one having a diameter of two millimeters or less while the length may be that of the ordinary appendix. Filiform appendices are slender white cords usually covered in part or all of their extent by the fold of Treves or that of Jonnesco and Juvara or what is commonly called a pericolonic membrane.

In the past year I have collected seven specimens of filiform appendices. Five of these appendices were completely covered by the fold and therefore were stated helling out from beneath the membrane before their delivery could be accomplished. One appendix was covered for its proximal three quarters of an inch the remainder being free. Another specimen showed the tip of the appendix bound down by the membrane while the remainder was practically free.

The filiform appendix was so named and described by Joseph Rulus Lastman.² Last man states that the proximal inch of the appendix may be of normal size but that the portion which is constricted by the overlying membrane may have a cross diameter of only two or three millimeters. He describes another type of filiform appendix namely that variety in which the vermiform appendix is drawn out into a fine strand the adherent tip drawing a small membrane from the mural peritoneum. By the courtesy of Doctor Lastman I am enabled to show you his original illustrations of these two types of filiform appendices of which I have spoken (Figs. 1 and 2).

I desire to direct attention to the fact that a filiform appendix is apt to be mistaken for an adhesion and that one may even be led to believe because of the difficulty so frequently experienced in their discovery that the appendix is either congenitally absent or that the organ has been obliterated by some pathologic process.

The principal types of these filiform appen-

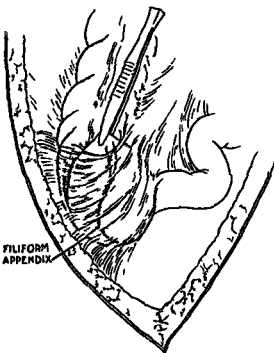
dices which I have been able to find are as follows. First the appendix in which the proximal inch is of normal size and free while the remaining part is enveloped by a pericolonic membrane. Second the appendix in which the tip has been caught on the mural peritoneum resulting in the drawing out of the organ into a slender strand. These two types I have already described. Third the appendix in which the proximal three-quarters of an inch is definitely constricted by the pericolonic membrane while the remainder is free (Fig. 3). It is only recently that we have found this type. There may also be another type in which due perhaps to some failure in caecal torsion the appendix may be caught in retrocaecal position and again become stretched out into a small cord. Fourth the appendix which is completely covered by the pericolonic membrane. Fifth the appendix in which the tip is covered by a membrane.

ETIOLOGY

The striking feature associated with filiform appendices is that they are quite constantly accompanied by or associated with, pericolonic membranes or folds. In other words this type of appendix is almost always found beneath a membrane and therefore one naturally assumes that a causative agent in the production of filiform appendices must be constriction by a pericolonic membrane to quite some extent.

The exception to this etiology of a filiform appendix is the type already described in which the appendix has been caught on the mural peritoneum and possibly the type which is found in a retrocaecal position in only partially descended caeci. This last type may perhaps be merely an affair of adhesions.

The condition of the terminal ileum caecum and ascending colon in cases where filiform appendices are found is a matter of considerable interest. Except in those cases of partially descended caeci with a retrocaecal appendix and in the instances where the tip of the appendix has been caught on the



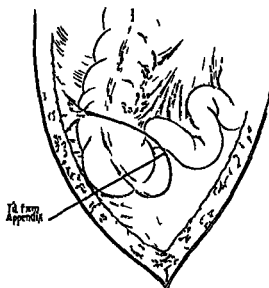


Fig. 4. Vermiform appendix. Strand adherent to drawing of small membrane from mural peritoneum (J.R.I. m).

MICROSCOPIC PATHOLOGY

I wish to acknowledge my indebtedness to Mr. E. N. Kime of the Indiana University School of Medicine for having made my sections some twenty five in number. These appendices were cut at various levels; some were cut in cross sections and others in a longitudinal manner. The one case of partial filiform appendix was cross sectioned at two different levels of the constricted portion and likewise the free extremity.

MacCarty and McGrath found that twenty two out of five thousand appendices examined microscopically were carcinomatous. They state that the lesion itself consisted of islands of masses of epithelial cells which were scattered throughout the submucosa, muscularis and subserosa. The nuclei presented the irregularities which are characteristic of carcinomatous cells. In these cases of early carcinoma the growth was in or near the tip of the organ and the lumen had been obliterated. The authors state that in their series carcinoma had occurred always in appendices in which the lumen had been partially or totally obliterated.

Am. Surg., Phila., 10 & May

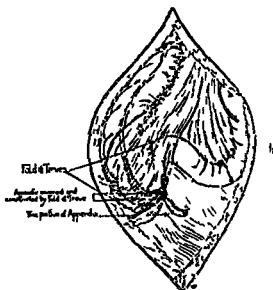


Fig. 5. Note the narrowing of appendix due to constriction by fold of Treves. Drawn from specimen.

ated. MacCarty and McGrath do not state whether a pericolic membrane was found associated with any of these cases of carcinomatous appendices with deficient lumina.

It is certainly more than a coincidence that carcinoma should only be found in the appendices with partially or completely obliterated lumina and therefore the obliteration of an appendicular lumen by a constricting pericolic membrane can logically be considered as a possible causation of appendicular carcinoma. In none of the specimens which we examined despite a thorough search have I been able to find any field of carcinoma nor has Dr. H. R. Alburger.

The following are the findings in several cross sections and one longitudinal section of filiform appendices.

Specimen No. 1 (Cross section). This appendix shows a beginning round cell infiltration in all parts except the glands. The gland epithelium appears as if it were being pressed together and under the low power (Leitz 1/5) I am able to see that some cells are analogous to those lining the basement membrane of the gland; have been freed to the lumen. In one gland the lower end is densely infiltrated by small round cells and this infiltrate is also present in the submucosa and muscularis. There are many polymorphonuclear leucocytes present in the interglandular stroma.

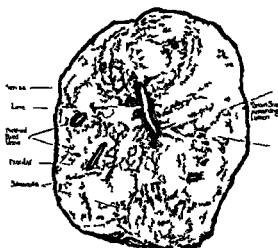


Fig 4 Cross section of a filiform appendix

Specimen No 2 Cross section This specimen shows a decided thickening of the blood vessels and the mucous membrane. The glands appear to be somewhat obliterated and are shut off from the lumen of the appendix by young connective tissue. In this specimen the small round cells are increased and there is also a considerable number of leucocytes. Here also the small round cells are observed to be very dense at the distal end of the glands and in some instance a few of the basement membrane cells of the gland have been forced towards the center.

Specimen No 3 Cross section Here some scar formation is present but the lumen persists. The glands are partially obliterated and appear as if they had been constricted for some time. There is an increase of small round cells in some leucocytes. The blood vessels show evidence of hypertrophy and the mucosa and submucosa are beginning to be infiltrated with connective tissue. The nuclei of the mucosa stain deeply while those of the submucosa and muscularis stain only faintly.

Specimen No 4 Cross section This section shows a degeneration (hyaline) of the submucosa and muscularis. The muscularis in particular appears disorganized having only a few faintly staining nuclei. The lumen is still present and the round cell infiltration is increased. There are no glands left. Two blood vessels with thickened walls and an almost obliterated lumen are present. The serosa appears thickened.

Specimen No 5 Cross section This appendix shows a distinct scar formation but continues to have a small lumen. The constriction seems to be in only of moderate severity. Blood vessel hypertrophy is present to moderate degree and the peritoneum is uniformly thickened. A small amount of fibrous tissue is present the muscularis and submucosa having been replaced by

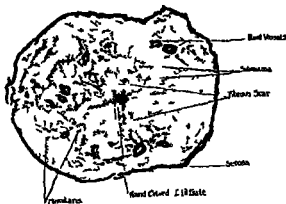


Fig 5 Cross section of a filiform appendix. Note absence of lumen.

this tissue to some extent. No glands are to be seen but round cells are present (Fig 4).

Specimen No 6 Cross section There is a lumen present but it is divided into two parts by the edges of the scar fusing together at the center of the lumen. No glands are to be seen but small round cells are abundant. The serosa is thickened and likewise the blood vessels which continue to have a small lumen. The fusing together of the edges of the lumen of this appendix appears to be of a fairly solid nature and seems to be of a fibrous type.

Specimen No 7 Cross section In this section there is evidence of long continued constriction since the center is represented by a star shaped scar there being no lumen. The peritoneum and blood vessels are thickened to a moderate extent and there is a seeming disorganization of the muscularis. There are no glands present. There is a moderate amount of small round cell present.

That portion of the appendix which in the ordinary specimen represents the lumen is occupied in this section by a star-shaped scar which appears to be a white homogeneous tissue of a fibrous nature (Fig 5).

Specimen No 8 Longitudinal section This slide shows hypertrophied blood vessels and a round cell infiltration of all the tissues. Glands are present and there is a round cell infiltrate of the stroma between the glands.

Specimen No 9 These two sections were cut from the appendix which had the membranous constriction of the proximal end for three quarters of an inch. The sections were made at both the non-constricted and constricted portions.

The non-constricted tip of the appendix had a normal lumen in contrast to the lightly decreased proximal portion where the constriction had occurred. The tip showed a considerable amount of round cell infiltration and leucocytes were present in a moderate amount.

The microscopic examination of the constricted portion showed as follows. All layers are infiltrated by round cells this being particularly marked by

tween the gland and in the submucosa and muscularis. There is considerable fragmentation of the mucosa this being noticed in two specimens which had been cut at different levels. The glands are seemingly squeezed together and are apparently constricted. A moderate number of leucocytes are present.

Dr H. R. Alburger, pathologist to the Indianapolis City Hospital, has kindly examined a few of my specimens and has suggested that the pathologic changes which have occurred in these filiform appendices have occurred in about the following order. The increase of the connective tissue has replaced the muscular coat and as this connective tissue contracts it causes a replacement of the muscularis by itself. This connective tissue next constricts the lumen so that what was formerly the lymphoid tissue of the submucosa occupies what was formerly the lumen, the mucous membrane having disappeared by atrophy.

There are probably two processes associated in the production of filiform appendix, namely a chronic inflammation and an involution due to the contraction by the accompanying pericolic membrane.

Howard A. Kelly in his work on appendicitis gives a microscopical picture of an atrophied appendix with an obliterated lumen. The center of this specimen consists of fibrous tissue containing a moderate amount of fat. The circular muscular coat is atrophic and the wall of the blood vessels are somewhat sclerotic. Kelly remarks that an obliterated appendix may be reduced to a thin fibrous cord or to a flattened band. Ribbert, Wölfler and Zuckerkandl believed that obliterative changes in the appendix are not the result of an inflammatory process but an involution process in a functionless organ while Bierhoff, Litz and Senn maintain that obliterative changes have a pathologic process.

DEPARTMENT OF TECHNIQUE

A MODIFIED INCISION FOR APPROACHING THE GALL-BLADDER¹

By L. L. McARTHUR, M.D., Chicago

IT will be generally conceded that when requiring extra room the majority of surgeons make the perpendicular right rectus incision modified after the suggestion of Bevan. That this gives the best access for any surgery required by the bile tracts cannot be denied. When it comes to closure of the incision, however, it will likewise be conceded that on many occasions the surgeon has learned that the difficulties of suturing the posterior sheath are often most trying and sometimes it is impossible. The transversalis whose fibers and tendon constitute the posterior sheath in this position is an active respiratory muscle and with each respiration so tugs and pulls on the line of sutures as to make it give way. To obviate this it is the practice in the Mayo clinic to include the fibers of the rectus in every alternate stitch. The usual

sutures being inserted *between* the bundles of fibers of the tendon meet with only the light intertendinous connective tissue and hence find little resistance to cutting out.

The very great comfort and benefit both to the patient and to the operator which comes from making the modification I am about to propose has but to be experienced once or twice to be thereafter utilized in appropriate cases. Let me emphasize here that the proposal is one for frank gall bladder surgery only and not for general surgery of the upper abdomen. In those cases then in which a perfectly obvious gall bladder drainage stone removal or ectomy is indicated let me urge the Fellows to incise the posterior sheath parallel with the tendinous fibers of the transversalis i.e. nearly transversely. To select the level for its incision about an inch above

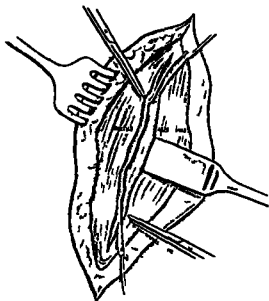


Fig. 1. Illustration schematically the first step in the right rectus incision. The incision is made to same crowded by blunt dissection at either end of the wound.

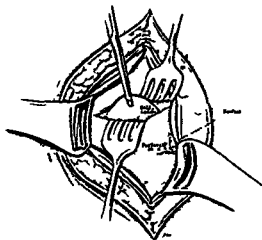


Fig. 2. Illustration of the transverse incision of the posterior sheath of the rectus (transversalis muscle and peritoneum) for access to the palpable distended gall bladder. It conserves the entire insertion of the transversalis muscle and its respiratory function. With the dropping back of the gall bladder its separated margin is pulled back into position and can be easily sutured.

Read before the Chicago Surgical Society, November 6, 1914. (See discussion, p. 83.)

the free end of the gall bladder making a small opening first for confirmation of the diagnosis by digital exploration. The incision can then be enlarged to the middle line and a *scar* literally as seems essential. Here we meet our first surprise for the transcruralis (posterior sheath) can with the gloved fingers be separated from the internal oblique with ease. Secondly when the necessary interference with the gall bladder has been made and the latter dropped back the cut margins of the transversalis are seen to be in contact and its respiratory action noted as continuing normally. Then with the greatest ease the cut edges can be whiplashed together with catgut sutures under absolutely no tension. The support thus given by the uncut transversalis renders tension stitches wholly unnecessary and makes easy the closure of the anterior sheath and skin.

A refinement in the separation of the muscle fibers of the rectus muscle after the cutting of

its sheath can be made by blunt cleavage from the midpoint of the incision with the handle of the scalpel in such a manner that the upper incision is carried without rupture upward, and the lower in like manner downward thus preserving intact the innervation of the mesial half of the rectus. The feasibility of this I have repeatedly demonstrated to my house officers and students and it is diagrammatically shown in Figs. 1 and 2 which are self explanatory.

I should apologize for taking even these few moments of your valuable time but I do not know the pleasure you will experience in it use particularly in the frankly palpable distended gall bladder as well as in the lessened suffering of the patient with every respiration because of the partial preservation of the abdominal breathing. Hernia cannot occur. The incision can at any moment be converted into the conventional one should circumstances demand it.

PITUITARY EXTRACT IN MARGINAL PLACENTA PRÆVIA

A CASE REPORT

B. JOHN CARDINER, M.D., TOLEDO, OH.

MRS. G. H. para I pregnancy normal except for a right marginal placenta prævia. The previous labors had been rapid so precautions were accordingly taken. It was the two hundred and eighty fifth day of pregnancy and while sitting in bed eating dinner there was a sudden gush of blood flooding the bed. This was the first symptom in the onset of labor. About ten minutes later I saw her and she was faint and blanched, the pulse hardly perceptible at the wrist. After placing her in the Trendelenburg position examination revealed blood still oozing from the vulva. The cervix was dilated four fingers. It was fairly relieved and without much increase of hemorrhage admitted of further distention. The perineum was also quite relaxed. One cc. of pituitary extract solution and one-thirtieth grain of morphia were given hypodermatically. Five minutes after the injection of pituitary extract as preparations were being made to pack the cervix and vagina the contractions of the uterus were increased. The contractions could be felt first on the left side of the abdomen passing over the fundus wavelike in character and rapidly

following one another. After a few seconds the uterus was seen to move to the right side of the abdomen and the same characteristic contraction could still be felt over the fundus.

The head descended causing a cessation of the hemorrhage. Eight minutes later the birth occurred. The cord was wrapped twice tightly about the neck. The child born in the state of a physu pulse rate forty two per minute was resuscitated. The placenta was expelled unassisted ten minutes after the birth. There was no laceration of the cervix and the uterus was contracted to the size of a goose-egg. The placenta was torn across through the maternal portion two inches from the border. The separated segment was covered with a blood clot.

This case of placenta prævia is reported because it permitted the control of the hemorrhage by the pressure of the advancing head. This course was determined upon because of the degree of dilatation and relaxation of the cervix. It is however an accepted obstetrical rule that great care be employed in the dilatation of the cervix in placenta prævia.

SURGERY OF THE CLEFT PALATE

By JAMES BERRY, B.S., F.R.C.S., LONDON, ENGLAND

THE operation by median suture (a modification of Langenbeck's) is the only one which restores the palate to its natural condition. If properly performed this operation gives the patient the best prospect of subsequent good speech. The age at which it is best to operate: the earliest at which the cleft can be satisfactorily closed by median suture, the exact age depending largely upon the nature of the cleft. Narrow clefts, especially if limited to the soft palate, can be operated on with advantage by this method within the first few months of life. The common single or double complete cleft associated with harelip should be treated by closure of the harelip in earliest infancy, the operation on the palate being postponed until the second or sometimes the third year. I have never advocated postponement of operation to any later period than this. At and soon after birth the cleft is usually very wide and the palatine arch low.

If any median operation were attempted at this very early period, it would usually fail unless pre-

ceded by the wiring operation of Brophy, which I believe is too dangerous to be generally employed. The reason for postponing the palate operation for a year or two is that after suture of the harelip the cleft in the palate undergoes rapid spontaneous narrowing and the development of the alveoli makes the arch higher. In proof of this I would call your attention to photographs of three similar cases of complete single cleft palate (Figs 1, 2, 3). Figure 1 shows the usual very wide cleft as seen soon after birth. Figure 2 is an exactly similar case in which after suture of the harelip and then a delay of two years the cleft had become so much narrower that it was easily closed by median suture with excellent result. The third case of the same kind shows a still greater degree of spontaneous closure. The patient was not seen by the speaker until she was ten years old, having been left unnecessarily long without operation.

I agree entirely with Sir Arbuthnot Lane as to the simplicity of his turnover flap operation and also with the statement that most mothers of cleft palate babies (and often their doctors) are



Fig 1



Fig 2

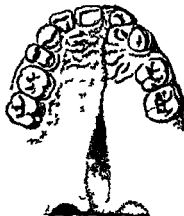


Fig 3

Three similar cases at different ages. In one of the commonest forms of cleft palate, namely the single complete cleft associated with harelip.

Fig 1. Patient died from another cause soon after birth without operation of any kind. If the cleft be closed at this early age in such a case it can be only a turnover flap operation or the wiring operation of Brophy, subsequently followed by median suture.

Fig 2. An exactly similar case. The harelip was closed soon after birth and the palate operation postponed for two years, by which time the cleft had assumed the appearance

shown in the photograph. The palate was then closed without difficulty by Mr. Berry's slight modification of Langenbeck's original operation of median suture and with good result.

Fig 3. Similar case in which the harelip had been closed in early infancy (by another surgeon) but the palate operation had been postponed much too long, namely until the age of ten years. It will be seen that the process of spontaneous closure has progressed still further. Closure by Langenbeck operation was easily effected with a good result.



Fig 4

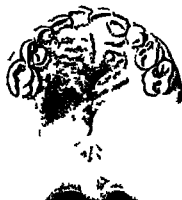


Fig 5

Fig 4 Median cleft of the soft and part of the hard palate without harelip the type of scar that is often most difficult to close by operation. From drawing made as were most of the others also from cast and from the living subject. The cast enables the artist to

reproduce the exact size with greater accuracy (Case No. 3)

Fig 5 The same child some little time after complete closure of the cleft by ordinary media (or Langenbeck) operation. The age of one year and ten months

exceedingly anxious that operation be performed as early as possible. This is but natural and accounts largely for the frequency with which such operations are performed at the present day especially by those who do not follow up their

cases and ascertain the actual results as regards subsequent speech. Sir Arbuthnot Lane so far as I know has never brought forward any proof that the ultimate result of the turnover operations are really good. Many present may perhaps remember how at the great demonstration of post-operative cleft palate cases arranged by the Royal Society of Medicine a few years ago, with the object of comparing the results of the various operations Sir Arbuthnot Lane exhibited but one patient and that a child too young to speak at all! Mr A W Murray myself and others, on the same occasion showed a large number of patients successfully operated upon by the Langenbeck operation or by some modification of it.

I believe that exact information as to the subsequent results of operations should be brought forward by the advocates of the turnover flap operation in early infancy. Why do they not publish long series of consecutive cases giving actual after results as the speaker himself has done more than once with regard to his own operations? With regard to lateral incision I have employed it much less than formerly as I find that the wide mattress stitch in the soft palate similar to that employed by Brophy for this part often renders it unnecessary. If employed at all it should be quite short.

The most difficult cleft to close satisfactorily among my cases was one in which the lip and alveolus were unaffected but in which a very wide cleft involved all the rest of the palate and had a rounded anterior end (Figs 4 and 6). In such



Fig 6 Cleft of soft and most of hard palate before operation. With the same patient exhibited at the meeting. Cleft completely closed patient now aged 26 and speaking well.



Fig 7

Fig 7 Double hare lip and cleft palate showing spontaneous closure of anterior part of latter after operation upon lip

Fig 8 To show how the nasal mucous membrane may be utilized in the closure of a unilateral cleft palate. The incision on the left side has been carried up to the nose along the wall of the septum. (Case No. 13)



Fig 8



Fig 9

Fig 9 A similar case after operation. The nasal mucous membrane being of a deep red color appears in the photograph as a dark triangular area immediately behind the nostril in the front of the palate which thus has not yet been closed.

case it is thought best as a rule to close the soft palate at some period during the earlier part of the second year and if necessary to postpone the operation upon the hard palate for some months when the opening would be found much narrower and capable of closure without difficulty. Often these clefts can be closed throughout at a single operation while in a very few exceedingly wide clefts treatment by obturator is preferable.

In concluding I wish to present three patients in whom operation have been performed for the three principal varieties of cleft described. These patients demonstrate the satisfactory nature of

speech following operation. In each case the whole palate was completely restored to its natural shape and the soft palate was freely movable without contraction or shortening. In one of these cases operated on some years previously the restoration to the normal appearance of the palate was so perfect that a member of the audience asked whether it was really true that the palate had ever been cleft. Fortunately the mother of the child was present and able to assure him that such had been the case. The width of the cleft in this case at the time of operation was 11 mm. In another (Fig 6) it was 25 mm.

THE PRINCIPLES WHICH COVER THE ULTIMATE RESULTS OF HARELIP AND CLEFT PALATE OPERATIONS

By GEORGE F. BROWN, M.D., JACOB MILLER, M.D., and WILSON

Oral Surgeon, Mary Hospital and Children's Free Hospital

THE vital issue in the controversy with regard to the surgical treatment of hare lip and cleft palate that has been waged so earnestly on both sides of the water during recent years when reduced to first principles and stripped of all confusing differences of surgical operative technique which are after all of secondary importance resolves itself into proper discrimination between the following surgical operative

method: (1) Compression (forcing the bulk of the bony palate in early infancy); (2) flap-reversing operation (Lane, Davies-Cole); (3) flaps of bone and mucoperiosteum (Bergson); and (4) mucoperiosteal flap-liding operation as in the von Langenbeck-Warren type.

Final results. The standard of value by which the decision in making selection is to be determined must be the final result. Therefore it is



I 2 I 2 8
 The following tendency to re-erect the lip and
 the lip-plate is infrequently observed in the
 Fig. 8. Same as in Fig. 1, but the lip-plate is
 of the upper lip and the lip-plate is of the nose
 and adjusted and the lip-plate is of the nose and

be most favorable to speech but the objection to this method lies in the fact that if the bone on either of the flaps should be destroyed by loughing there could not very well be regeneration of the lost portion of the palate and the situation of such a case would be practically hopeless. Inasmuch as it is sometimes necessary to perform operations the effect of which shall be constructive rather than complete in very difficult cases this objection is a serious one.

1 on Langenbeck's operation. The von Langenbeck operation with certain modification that have suggested themselves in the course of my work has given me my best results but any specific method of performing taphylorrhaphy alone is, after all, insufficient to meet the demand of these cases.

Systematic treatment. Only by systematic treatment from the very beginning in infancy can the greatest benefit be conferred upon the individual. It is the development of a complete system and the perfection of technique rather than new original operations that I have long believed were most to be desired in the care of these patients. The system that I have adopted and the modifications of the von Langenbeck operation that I employ have been fully described and illustrated in my work. The Surgery of Oral Diseases and Deformities and may be briefly described as follows:

Adhesive strip across lip. The adjustment of an adhesive strip from the malar region upon one side across the lip fissure in infant cases to the same region upon the opposite side of the face calls into play the child muscles which would otherwise increase the deformity and

compensate them as an aid in the process of narrowing the fissure and correcting the undue prominence of the premaxilla. This aid tends to straighten the dislocated triangular nasal cartilage at the same time better breathing and nourishment taking are facilitated and the infant usually thrives better. It also becomes accustomed to the restraint and does not fret or fight the suture so much after the lip operation has been performed. By this treatment one operative step leads to the next in such manner as to reduce its difficulty and normal post-operative development is facilitated. Figures 1 and 2 which show pictures of a case in an infant illustrate the actual developmental results of this method.

Operative steps. The von Langenbeck operation and such modification of it as I have found most useful may be detailed as follows. Among the most notable features is the absolute control of the field of operation which is afforded by the mouth gag that I use. This is a Whitehead gag changed to give a better view of the anterior part of the mouth. After paring the fissure borders the mucoperiosteal palatal flaps are raised with periosteal elevators of different sizes and bent at different angles so that the periosteum may be separated from the bone surfaces with the least possible amount of trauma. Since the slope of the sides of the palate upon each side of the fissure vary in different individuals the direction of the force applied which is largely governed by the form of the periosteotomy is an important matter. My taphylorrhaphy needles are of different sizes and curves in order to meet the requirements of future insertion in the anterior middle and posterior portion of the palate with the least possible injury to the flap tissue.

One aluminum bronze wire retention suture with small very thin silver button plates to secure it upon each side is placed through the central portion of the soft palate. The silver plates are secured by lead shot clamped upon the wire and are so situated as to have the resistance of the thickest part of the muscular tissue of the soft palate. The intervening tissue is less likely to cut and slough if swelling occurs than it would be if included within the loop of a complete suture. The coaptation sutures are of formalized polyketin gut. This retains its integrity long enough to permit union to take place and after that its disappearance is an advantage. There is much difference of opinion with regard to literal incisions in these cases, and the correct decision in this respect quite naturally depends upon the width of the fissure and the character of tissue in and about it. But entirely aside from the question

of the relief of tension which undoubtedly given by liberation of palate tissue in this manner I am firmly convinced that better speech results are favored by incisions on each side downward and backward behind the molar teeth following as nearly as possible the lines of the muscular raphe, and the carrying of the soft palate muscles bodily toward the central line.

Nasal form important. Next to the form and character of the tissue that may be obtained as a covering for a palatal fissure by uranostaphylo-rhaphy the most important feature is to secure a good nose. Not infrequently in cases in which the speech improvement has been disappointing although the appearance of the result of the palate closure was all that could be desired. I have found that an unusually large naris or other nasal defect has been largely responsible for this disadvantage. Much benefit has been given these patients by surgically raising the floor of the nose, reducing the defective form of the cartilaginous wing upon the affected side and such general intranasal and extranasal reconstruction as seemed to be required to aid this portion of the speech apparatus. The effect of this treatment is often exceedingly gratifying to both operator and subject and it should receive more attention than hitherto deemed necessary (Figs 3 4 5 6 7 and 8).

Speech relation of age and operation. There is much to be said upon both sides of the question as to whether the best speech is obtained by palate

closure before the child begins to speak or after ward when wrong speech habits must be overcome. Theoretically it should always be necessary to have the palate fissure closed before the child begins to talk. Practically this is not always so and the decision depend upon many modifying factors. In order to be on the safe side I make every effort to provide as perfect a palate as possible at a sufficiently early age to make sure that no adverse speech habits have been acquired. Therefore all operative procedures are completed if possible before the child is 2 years old and preferably at 18 months or even earlier. Nevertheless it is true that some of my best results as evidenced by freedom from the characteristic cleft palate speech sounds have been secured with patients whose ages at the time of the palate operation varied from nine to sixty years and some of the most imperfect speech results have been with patients that were completed before they were two years old. The natural conclusion from this especially when one considers another class of cases in which there is defective speech of similar character due to imperfect form in development of hard or soft palate although without any indication of a cleft is that perfection or imperfection in form is of paramount importance and often a more active factor in determining the speech results after cleft palate operation than the speech habit difficulties which have been hitherto considered of first importance.

FACTORS OF SAFETY IN CLEFT-PALATE SURGERY

By JOSEPH RILUS EASTMAN M.D. I.A.C.S. INDIANAPOLIS

IN the Langenbeck or similar flap operations there will be much less likelihood of separation of the wound margins and consequent failure of union if the mattress coaptation sutures after being reinforced by a simple running suture are further supported by a continuous relaxation suture passing around the free edge of the anterior palatine arch.

The anterior part of the soft palate for a distance backward of eight or ten mms from the edge of the hard palate contains practically no muscular fibers being composed almost entirely of palatine aponeurosis. Therefore the anterior portion is much less movable than the rest of the soft palate. The tensor palati acts upon this part of the palate but as this is usually divided

when the Langenbeck flaps are dissected up it is not an important factor in causing separation of the wound margins. The posterior and large part of the soft palate contains muscular fibers in abundance and is freely movable being the portion upon which most of the palatine muscles act. The supporting or relaxation suture referred to follows the course of the palatoglossus muscle or constrictor isthmi faucium. As a rule the use of this arch suture obviates the necessity of division of the levatores palati and palatopharyngei muscles. Thus affords a decided advantage since the section of these muscles reduces the blood supply to the flaps and can have only a harmful effect upon subsequent phonation. Fine celloidin linen or von Brun's hemp such as

Palate Relaxation Suture (SPEARS)

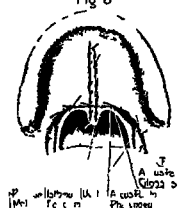
Knotted Loops Fig 1



Fig 3



Buttonhole Palate Relaxation Suture

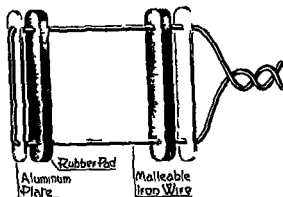


is used for the mattress sutures and the continuous coaptation suture should be used for the suture which is to immobilize temporarily the anterior palatine arch or arcus palatoglossus.

The immobilizing suture may be introduced as a series of knotted loops or as a running buttonhole suture. The former is the more secure. The knotted suture is introduced by passing a small curved needle bearing the long line or hemp thread through the edge of the anterior palatine arch on one side near its base that is, near the side of the tongue. The thread is drawn through to its middle and secured with a reef knot leaving the tail of the suture long. At a distance of three or four mms from the first or outermost knot, the needle is again passed through the edge of the arch the tail of the suture

is taken up and another reef knot tied. This process is continued around the anterior palatine arch to its base on its opposite side the suture crossing in front of the base of the uvula. The manner of applying the running buttonhole suture requires no explanation.

Such a suture immobilizing the anterior palatine arch reinforces the coaptation sutures against the traction incident to deglutition. In cases in which there has been failure of union in the anterior part of the soft palate the use of the arch suture described has established union of the posterior part of the soft palate followed promptly by closure through granulation of the forward defect. Such a suture is much more secure than the mattress suture for the reason that tension is distributed over eight or ten points



instead of but two and the danger of cutting out is proportionally lessened

General anesthesia was never of much value in cleft palate surgery and with the present development of local anesthesia may be said to answer no valuable purpose. Elimination of the general anesthetic and employment of local anesthesia removes many of the dangers of palate surgery and adds greatly to its simplicity. If adrenalin be added to a solution of novocaine the technical difficulties are diminished in a surprising degree as hemorrhage then becomes negligible. The lessening of hemorrhage is not only important because it renders dissection of flaps and the prising of sutures so much easier of execution on the bloodless field but also because it safeguards the patient against shock and serious disturbances of metabolism. Local anesthesia protects against shock not only by minimizing hemorrhage but also by acting as a nerve-block.

If the solution used is not too strong that is not stronger than an aqueous solution of 0.5 per cent of novocaine (1-200) with 0.02 per cent of adrenalin (1-5,000) the danger of slough is inconsiderable. In the newborn ten to twenty drops of this solution on each side suffice to induce anesthesia and blanch the tissues.

In the Langenbeck operation the point of the hypodermic needle should be entered slanting inward along the line of the lateral incisions to be made for dissection of the lateral flaps. The forcing of the fluid under the mucoperiosteal flap facilitates the subsequent dissection. The solution should be injected by gentle pressure from the line of the lateral incision toward the free edge of the cleft to the end that paring of the edges of the cleft may be attended by minimal hemorrhage. If local anesthesia is to be used the head of the patient may be placed in any position to suit the convenience of the operator without danger of blood entering the air passages.

In extensive operations the swallowing of more or less blood is almost unavoidable. No matter what position is used or what precautions are taken some blood is usually drawn into the stomach during the repair of cleft palate.

After an extensive palate operation the blood is sometimes discharged in vomitus but more often it is passed off by the bowel. The presence of this blood in the stomach of an infant or small child is not infrequently productive of serious disturbances of metabolism. The symptoms arise usually very soon after the deglutition of the blood sometimes within a few hours. The absorption of the pyrogenic constituents of a large quantity of blood quickly induces a high fever. The pyrogenic substances here concerned are probably identical with those which cause the so-called aseptic surgical fever. It is established that solutions of hemoglobin have a pyrogenic action. Schimmelbusch isolated from the blood a pyrogenic ferment, hystocym and has demonstrated that this body which is a product of the normal metabolism when introduced into the circulation in sufficient quantities can give rise to high fever.

By others the heat producing property of blood has been attributed to fibrin ferment and the nucleus.

Whether these substances actually produce heat or merely interfere with heat elimination is not understood.

It is likely that there is some intimate relationship between the so-called aseptic surgical fever and that fever occurring in conjunction with constipation following operations. The pyrexia in either case is doubtless due to the absorption of soluble decomposing materials which are fabricated in the intestines either with or without the cooperation of bacteria.

The experiments of Schmidt and Hammer-schlag led them to believe that transfusion of blood into an animal will always produce more or less fever and that free fibrin ferment may be found in the blood of fever patients very much more often than in those having a normal temperature. Thus it appears that some constituent of the blood whether hemoglobin, fibrin ferment, a nucleus or an albumose has the property on being absorbed into the general circulation of producing fever.

Observing infants after cleft palate operation it has occurred to the writer that the degree of fever varied directly according to the severity and duration of the operation that is the more blood swallowed the greater the pyrexia. It is possible that the direct absorption of blood from

the stomach does not produce the fever in these cases. It is of course, possible that the presence of the blood simply leads to fermentation of other intestinal contents with consequent disturbance of metabolism but however this may be the fact seems established that the blood in the stomach of an infant is either directly or indirectly thermogenic and is therefore a serious menace because of the high fever which it may induce. Conversely it has not been difficult to show that the prompt removal of the blood from the stomach of the infant by lavage militates strongly against the development of the fever. The introduction of a medium sized male catheter and thorough rinsing of the stomach if done promptly after palate operations will therefore remove an element of danger.

In palate surgery as in other surgery much depend upon the selection of the appropriate operation for the single case at hand. There is little doubt but that the failure to choose the proper operation for the specific case is more often culpable for failure than any of the other recognized causes of failure. There are so many varieties of cleft palate that there can never be a single operation which will apply to all cases. There always will be many operations. The development of the art cannot eliminate them.

In many cases of narrow cleft combined with high cathedral arch it is not difficult to coapt the edges precisely and without tension after separation of the mucoperiosteum from the hard palate.

In cases of high palatal arch therefore if the cleft be not too wide it is useless to make paralyzing incisions for the relief of tension for the two halves of the loosened mucoperiosteal palate will fall together like the two halves of a cantilever drawbridge and may be sutured without tension if the soft palate be quite completely separated from the hard palate at the posterior border of the latter as advocated by Berry.

It is distinctly worthy of note that lateral incisions are rarely of value. With curved scissors one can nearly always free an abundant flap by beginning at the root of the philtrum on each side and cutting forward on the nasal side of the edge of the cleft.

In cases in which the hard palate is almost horizontal with associated widening of the alveolar arch the compression method advocated by Brophy is not to be regarded as provided the cases seen during the first few months. I have found few cases in which the compression method was of value and in these few instances have been obliged to follow it with a flapping

operation after Lane, Langenbeck or Davies-Colley. I have not been able to prevent a slight turning inward of the alveolar processes in any case even when the root of the zygoma was partially or completely chiselled away in order to secure a high application of the plates. Nevertheless, it is a mistake to say that the Brophy plan of compression is without value. The deformities of cleft palate vary greatly. Many surgeons have denied Brophy's statement that a large percentage of cases of cleft palate are associated with widening of the alveolar arch. However only one whose observation embraces every cleft palate everywhere could say that this associated abnormal widening of the alveolar arch is never present. Now and then it is found in association with a flat or nearly horizontal hard palate and complete wide cleft and in such a case Brophy's plan of compression may with good reason precede a flap operation. In such instances, Brophy's apparatus of silver wire and lead plates may I believe with some advantage be replaced by malleable iron wire and plates with soft rubber pads. The rubber lying between the aluminum plate and the alveolar process minimizes trauma and exerts a constant elastic pressure. Malleable iron wire is so much stronger than silver wire that its value is much greater when considerable force is required. The two tied ends of the wire should be allowed to hang out the corner of the child's mouth. Thus they are always available for twisting and occasion the least annoyance.

The end of the malleable iron wire should be brazed smoothly to the butt of a stout curved steel needle. This gives a smooth joint which may be drawn through the tissues of the maxilla without adding unnecessary laceration to that produced by the needle point.

It is an old and quite generally accepted view that to operate for cleft palate on a child under three months of age is unwise. This is as Sir Arbuthnot Lane says a matter of tradition. It may with reason be contended that under ordinary condition cleft palate should be operated upon within the first week after birth.

The rule to operate early however should not apply to infants which are in a general physical sense so far below the norm that even a light surgical procedure must be attended with great risk. The physical resources of such an infant can often be augmented by a few weeks of careful feeding. In the case of an extremely weak baby if the cleft be complete and wide it is probable that nothing can be gained by delay in equal feeding; difficult or impossible and result

ing power steadily reduced by the breathing in of cold air through a roofless mouth G V I Brown who counsels in favor of a reasonable delay to the end that the operation can be done with the proper assurance of safety does not deny the advantage of early operation if conditions are favorable

The very fact that the infant has just passed through the birth canal with all the brutal mechanical insults which may be incident to this excursion suggests the presence of a tolerance to traumatism which becomes less in evidence as the infant grows older

In ordinary cleft palate operations under local anesthesia during the first week the loss of blood should be trivial but however this may be the danger from loss of blood is not greater than at a later period Experience has not suggested the slightest foundation for the truth of the statement that young infants do not bear the loss of blood well If there is any reliable evidence to the effect that a very young infant does not bear the loss of a given proportion of its blood as safely as an older individual we have no knowledge of it

The vital resistance against trauma and hemorrhage of guinea pigs and rabbits has a higher index upon the day after birth than upon succeeding days Prof B D Meyers of Indiana University states that a baby rabbit can be operated upon up to twelve hours after birth without an anesthetic and with no apparent perception of pain there being no outcry during such a procedure as the enucleation of an eyeball Eighteen hours after birth such operations cause the animal to cry out

Meyers call attention to a probable relationship between these phenomena and the circum-

stances that at the time of birth the sensory nerves are in an imperfect state of medullation and are therefore not good conductors

It is not known at what time medullation becomes complete in the human Omic acid is known to blacken medullated nerves but the nerves do not blacken with this agent up to four teen hours after birth

Another phenomenon of interest in this connection may be noted by removing first the heart of a rabbit twelve hours old and then that of another rabbit twenty four hours old The heart of the twelve-hour rabbit will continue to heat for an hour and a half whereas the heart of the twenty four hours old animal will cease almost immediately

This single phenomenon if it may be taken to indicate anything suggests a marked difference in vitality (even if it be of an automatic sort) or a great difference in sensitiveness to external influences After early operation the nasopharynx is forcibly dilated and developed by breathing Nutrition is not impaired and the child is brought into normal condition before speech defects are established

There is little doubt but that surgeons who make a rule to operate in the second or third year will have a lower mortality rate than those who operate early The reason for this is not far to seek Only the strongest survive the two or three years without early operation The late operations are therefore good surgical risks How large a percentage of those which are not operated early perish from disturbances of nutrition before the third year it would be difficult to estimate It may safely be conjectured that the percentage is high Many of these can be saved by early operation

ON THE TREATMENT OF CLEFT PALATE

BY I W GOYDER M.D. F.R.C.S. D. DENT. I. LOND.

ENGLISH surgeon have often been charged with ultraconservatism in their ideas and method and there is no doubt that the majority sometimes just inert and in general men have in the past devised new methods dealing with old subject but tradition and inertia have caused the method to be neglected and the idea to be fallow However surgery is a progressive science and such hindrances are

almost of the past Although scientific progression is in a succession of forward steps it is often necessary to call a halt that a faithful review of the advancement made may be taken That is one of the functions of a congress such as this A forward step is not necessarily always in the right direction and bearings must be taken to discover whether the new departure is an improvement upon the old position It is necessary

to take new steps if the old position is found to be unsound but it may be necessary to retrace one's steps if the new position is found to be worse than the old. To apply this metaphor to the subject under discussion we can truthfully say that operation in childhood is an improvement over operation on adults for cleft palate. It is a step in the right direction. Can we as truthfully say that operation in infancy is better than operation in childhood? Has operation in infancy been a step in the right direction? There is only one way in which such a question can be decided. It is by the publication of a consecutive series of cases giving the full details of the results of any given method of operation. In England for the later operation abundant evidence has been produced in the wonderful series of cases published by Mr. James Berry. We know exactly what results can be achieved by Langenbeck's operation performed at or about the age of three years. We know that the results as regards speech although by no means ideal can be made almost ideal if persistent efforts are made in re-education. It has been assumed that operation in infancy prevents the formation of faulty habits of articulation. This may be so or it may not. In England we have no figures either to prove or disprove it. Until we obtain them we are in no position to judge of the superiority or the reverse of the method. If the members of this congress will give us as I am sure they can these missing data we shall be in a position to settle once and for all this much disputed matter. Many English operators feel that if we could only get at them the results of early operation would turn out to be at least as good as the results of operation in childhood but no such belief in the absence of figures is of any value as evidence in a question such as this. As they stand in this country the published records are strongly in favor of Mr. Berry's claims.

Speaking personally I was brought up in the school of Sir Arbuthnot Lane. I have the greatest admiration for his inventive genius and his operative ability and considerable faith in his methods of dealing with the problem. I have employed and do still employ his methods though not exclusively. But I believe that each case of cleft palate must be dealt with on its own merit and therefore that there can be no fixed age for operation. If deaths following operation are to be avoided as they can be it is only by the careful choice of the most favorable moment for operation.

A point rather frequently lost sight of is that Lane's method are applicable at any age while

Langenbeck's unless preceded by some such operation as Brophy's is impracticable in infancy. I have endeavored in my Jacksonian essay to show that after early closure of the hard palate, complete clefts of the palate can usually be closed by Lane's method at or about the age of twelve months without using a flap large enough to uncover the unerupted teeth so that while retaining the advantages of early operation, the danger of damage to the teeth can be avoided, and an effective soft palate can be fashioned. I hope to be able to show in the course of time that good speech and a good functional palate is the result of this modification. But until some time has elapsed I must judge by the results of other operators, so that I should welcome the views of those here to-night on the following points.

It has been repeatedly said and copied from one article to another that early operation prevents the patient from getting into the habit of articulating into the cavern of the nose or that the child will learn to articulate without the so-called nasal speech because when he learns to talk the cleft has already been closed" (F. N. G. Starr, Toronto). I should like to ask. In what percentage of cases, if in any have children, operated on in infancy for cleft palate developed normal speech? This seems to me a fundamental question. Consider for a moment the effect on the position if these claims turn out to be well founded. The child will speak normally from the first and no special training in speech will ever be necessary. Hence early operation would be put in a very strong position. Special speech training is invariably necessary after operation in childhood if only because bad habits have to be corrected. A majority never speak normally. A slightly greater mortality after early operation would hardly outweigh the advantages of perfect speech. I am beginning most reluctantly to admit to come to the conclusion that very few children speak normally without special training after cleft palate operations in infancy. I may be wrong. I hope this meeting will prove that I am. I have endeavored to show in the essay to which I have alluded that if the soft palate is not mobile or not sufficiently long normal speech will not occur even though the operation is performed in infancy. Mr. Brophy's method more than any other operation in infancy should result in an effective soft palate. I should expect, then that his percentage of good speech results would be higher than that obtained by operators by other methods. It would be interesting to compare views on the necessity for length and mobility in the tutored soft palate. My own belief is that

length; more important than mobility but that given an intelligent child and adequate training neither is essential to an ultimately good result.

I should like also to ask the exponents of the later operation whether the soft palate after operation is ever as long as it should be. I am inclined to doubt if it ever can be.

Another important question is the percentage of cases in which the united segments of the palate come apart some time after successful suture.

The question of mortality becomes of importance only when it is proved that early operation gives better results as regard speech than does the late. If the results are about equally good (or bad as the case may be) that operation must be chosen which has the lowest mortality. But as we all know in operations on infants a low mortality is the result of selecting the most favorable period for operation and of most careful and skilled nursing. At the same time the operation must not be too severe or last too long. As to the remote mortality I have noticed with interest that of the cases upon which I operated in infancy very nearly all are alive while of the cases in which operation has been deferred the mortality chiefly from respiratory troubles has been considerably larger. I am not urging early operation as a life-saving procedure but merely pointing out that cleft palate does add to the risks of life especially in early years.

I should be glad to learn from Professor Keith why left-sided clefts of the lip and palate are so much more common than right-sided ones. Also whether I have any ground for my belief that at birth the divided segments of the soft palate contain less tissue than the normal soft palate at the same period of life.

To my mind a complete record of a case of cleft palate should include—

- 1 The type of cleft
- 2 The age at operation
- 3 The details of operation

4 The result as regard appearance scarring mobility and length of palate immediately and ultimately

5 The result as regards speech after a sufficient interval has elapsed

6 Speech if any previous to the operation and the mental capacity of the child

7 Speech education Whether it has been available or made use of

8 The nutrition of the child at the time of operation

9 Antenatal pathology. From the point of view of antenatal pathology many points such as the ages nutrition and position of the parents a pedigree of the family previous illnesses of the parents (especially syphilis) are of great interest.

But the first and most important duty of a surgeon interested in this difficult branch of work is to keep full and accurate statistics especially as regards speech not only for his own use but for the advantage of other members of his profession and thus to carry out the objects for which this great congress was formed.

Finally let us consider what position we are logically bound to take when we have full figures to guide us. If it is shown that early operation prevents in a fair percentage of cases the establishment of cleft palate speech and that in the remainder education corrects it we must adopt early operation if the mortality is not excessive and the sole remaining question is a choice of the method—Brophy's Lane's or the method of some other surgeon. If on the other hand early operation shows no improvement over the later as regards speech we must be guided by the relative risks and dangers of the various methods.

The sole reason and excuse for this paper is to point out the importance of facts and figures. New methods are inevitable if surgery is to progress new developments are legitimate and essential but until their authors can show statistics justifying the faith that is in them these methods cannot command for any length of time the attention and support they deserve.

THE LATE RESULTS OF CLIP-PALATE OPERATIONS¹

BY TRUMAN W. BROOKS, M.D. D.D.S. L.D.S. L.A.C.S. CHICAGO

ANATOMICALLY there are fifteen forms of cleft palate. A cleft palate is not the result of arrested growth of the palate or the absence of a portion of the palatine tissues. All children who have congenital cleft palates with rare exception have in the palate the normal amount of tissue although it is not united in the median line. It clefts. The tissue I have always declared will atrophy if not put to use; statement to the contrary is twitting language but with rare exception there is at birth in these cases a sufficient amount of tissue to close the cleft and bring the upper arch into harmonious relation with the lower one. In rare cases in which there is a deficiency of from five to ten millimeters I move the lines together and close the cleft. Many narrow arches much narrower than these are easily expanded by the orthodontist.

The statement that at all ages the upper jaw is broader than the lower is not based upon actual measurement or upon careful clinical observation. A cleft palate jaw is almost always broader than the lower but the normal upper jaw is always narrower than the normal lower jaw. I specially wish to state that from second bicuspids to second bicuspids above and below. In the age of the narrow upper jaw is in striking contrast with the lower jaw which is often one third wider than the upper jaw.

In a young normal infant the buccal ridge of the maxilla lightly lips over the ridge of the mandible. In a cleft palate infant the force exerted by the mandible forces them still farther and farther apart and widens the cleft. The tongue of a cleft palate child rests in the cleft and extends into the nasal passage. The tongue no doubt interferes with union and the force exerted by the mandible increases the breadth of the cleft. The primary cause of cleft palate and harelip has been pointed out by Becker as the epithelial lamina which dips down deep into the submucous tissue to form tooth enamel. I believe this is the first publication of this Boeckler's theory. Laboratory work will demonstrate that he was either right or wrong.

In utero impression may be a factor in causing failure of union. Proof of this however has never been established. Defective nutrition or the general debility of the mother during early months of gestation may delay union. Heredity is unquestionably a powerful influence.

Operations upon the palate are divided into two general classes. Operations in early infancy (i.e. before the sixth month) and operation at a later period.

Early operation is a wound; a cleft of the tissue. A cleft palate is in every sense like a wound. If an infant were thrown from a vehicle into his palate pit would the surgeon advise waiting a few years before closing it? No. The first impulse of the surgeon in the presence of a wound is to close it. He should so treat a cleft palate.

The immediate effect of an operation upon the palate in early infancy is before the age of five months is the marked improvement noticed in the general nutrition of the infant. He is now able to take his food through the nipple with comfort and as a result he gains in weight and strength. In closing the cleft the dental arch becomes normal and the line of union quite firm. The child changes from one who is constantly fretting and ill to one who is contented. If this in his first ten to fifteen years after the operation one will not find that the dental arch has not become normal in any way. If rent from normal in the same general features who has or has a cleft palate. The teeth occlude properly and the line of union in the upper jaw is hardly discernible. The line of union in the palate is acted by soft line and pressing the hard palate to firm bony arch. The soft palate has closed and will continue to be strong. This is a normal one. If the operation is properly performed the space between the nasopharynx and the soft palate will be such that normal function will be secured. A most of these patients have had no conjunction with the cleft palate. It will be noted that the line of union in the lip is now represented by a faint white line and that the normal cupid bow is present. The line of the nose is perfectly formed and the nasal septum is straight and the patient is sufficient with less or other diseases tending to promote nasal deformities. On speaking no difference is noticed in pronunciation nor does he find any difficulty in accomplishing any vocal effort.

Only two operators have devised plans for the correction of cleft palate in early infancy. Sir Arlith and I use a myself — and we both have been criticized more or less severely to the points at issue. Mr. Lane's work I cannot

make a statement but as to my own work I am satisfied that other surgeons have not succeeded in doing the operation because they do not understand the technique. My methods have been presented by some authors to European surgeons in a manner so faulty that failure would necessarily result if their illustrations were followed. The broad statement that deformed parts should be corrected early and brought to as nearly a normal position as possible is so obviously true that I believe no one should question it. Many surgeons are of the opinion that infant operations are not expedient since tissues break down and stitches cut out following an operation. With the improved technique however such unfortunate results should be avoided.

I have seen infants upon whom Sir Arbuthnot Lane has operated and whose palates have been completely closed. I have not however had the opportunity to study them with a view to ascertaining the quality of their speech. Mr. Lane does not seek to secure a bony union but closes the fissure with a flap. A solid bony arch therefore would not be produced. The test of his work will be the condition of the parts in adult life and the ability of the patient to speak correctly.

The operation in early infancy brings into action the muscles of the palate and the muscles develop instead of becoming atrophied for want of use. Hence a good velum is secured with plenty of tissue whereas if the operation is delayed the muscles cannot as surely be made to subserve the same purpose as tissues which develop through natural employment for the muscles of a cleft palate are not normally employed and by operating at a very early age they are at once brought into use and their development is proportional to other tissue. Also if the operation is done early there is much less deformity in the bony arch as the soft tissue. Therefore the most important reason for making the early operation is that a normal condition is established which enables the child to speak as distinctly as children do who were born without this congenital defect.

Lat operation. When the operation is performed in late infancy, i.e. when the child is from six to twenty-four months of age the conditions are a little different. The immediate effect are the same but while in some instances the alveolar border are brought in contact by traction of the maxillary or muscle following closure of the harelip the tuberosities of the maxillary bone still remain widely separated and the posterior part of the cleft consequently will also be widely separated. This separation might have been avoided if the bones had been approxi-

mated at the proper time. As the patient grows older the difficulties increase in operations upon the palate. The palate produced by the operation at this time of life is not strictly speaking normal. It usually differs in this respect the arch is broader and remains broader. The wider the cleft the shorter the velum and therefore the soft palate does not approach the posterior pharyngeal wall as it normally would. When the palatopharyngeal muscles have in part been added to the end of the velum the palate is made to reach the posterior pharyngeal wall. In broad clefts the upper teeth usually occlude correctly with the lower. To accomplish this the mandible becomes wider. Therefore as the result of the cleft at this time of life the jaws in the region of the molar teeth have become wider than normal. The nose of a patient having single harelip and complete cleft is almost invariably deflected to the side opposite the cleft and the nostril into which the harelip extend is widely expanded. The face is asymmetrical but it is not always conspicuous and phonation is not as clear unless the palatopharyngeal muscles are in part utilized to lengthen the velum. The parts brought into play by the act of speaking are not as fully developed as in patients operated on in early infancy the muscles have failed to develop from disuse.

If time permitted I could enter into more detail but I wish to state that the results of my operations have proved by the test of time that the following statement which I have so often made is true. To obtain the best results the operation should be performed in early infancy preferably before the third month.

Cutting or breaking the bones of the hard palate to secure union is an unnecessary procedure. The lateral incisions of Langenbeck, Ferguson and Agnew which were and still are regarded by some surgeons as essential to relieve tension must in the light of modern methods be discontinued. In 1883 I used in the soft palate wire tension sutures and large long lead beads to suspend action of the muscles and to hold the edges of the fissure in proximity. After union took place these beads were removed. A little later I substituted lead plates for the beads and have found them indispensable.

Lateral incision in the soft palate are unnecessary and I should never be made for the following reason.

1. The ascending palatine or the large branch of the posterior palatine artery is divided thus causing unnecessary hemorrhage.

2. The blood supply to the palate which we so much need in a great measure cut off.

3 A new field for infection is established
4 The nerves are divided and atrophy may result

5 If the tensor palati muscle is completely divided it never reunites, and consequently an important factor of the palate is destroyed

6 The tensor palati muscle by traction dilates the pharyngeal orifice of the eustachian tube. If its function is destroyed defective hearing must ensue

7 The scar tissue which forms following the incision makes a thick clumsy palate without that flexibility and resiliency so essential to perfect function

8 The palate is made shorter instead of longer as it may be made by dividing it from the posterior border of the horizontal plates of the palate bones and using lead plates and wire sutures to relieve tension

Finally to attain the highest degree of success and to avoid infection we should use sutures which cannot absorb secretions—horse-hair, silver wire and lead plates

A cleft palate may be closed but phonation—correct speech—is the supreme test of the surgeon's work

DR TRUMAN W. BROPHY, closing the discussion of his paper on "The Late Results of Cleft Palate Operations," said:

I have brought from America three patients to exhibit to you their powers of phonation. It is an easy matter to make declarations as to the ability of patient to speak following cleft palate operations. I do not intend to dwell for any length of time on this phase of the subject. The patient will speak to you themselves and it will remain for you to determine whether the results of the work done according to my own methods, has been successful and whether the object desired in securing for the patient perfect speech, has been attained. The patients are operated on at different ages.

The first one was thirty years of age when the operation was done. She wore an artificial palate for several years before I operated. I have it here. You will observe that this is a very broad cleft, the kind that many surgeons believe inoperable. This cleft, as closed without making Langenbach lateral incision. As I remarked in my paper I regard these incisions as absolutely necessary for the purpose of closing the soft palate. To effect union and

secure soft flexible useful palate, the tissues must be closed with wire tension sutures adjusted and fixed upon lead plates.

You will observe that the palate is soft flexible and unmarked by scar tissue which almost always follows where lateral incisions are made, and that it reaches back to the posterior pharyngeal wall. You will also note that her articulation is perfect. She speaks so distinctly that the most critical listener cannot detect the slightest defect in her voice. Thus, however, does not always follow an operation which yields the same result. In this case so far as the operation itself concerned. Many times here the operation has given equally good results. The patient must be taught how to use the lips, the tongue—in all the parts that enter into the formation of speech.

You will notice that all I have said regarding the operation of adults is different from what is true in the case of children. Miss Miller has said in regard to perfect speech I am satisfied that such results, provided the palate is not mutilated by the formation of scar tissue can be secured in nearly all cases provided the patient is taught the mastery of his vocal organs. It only shows that one who is determined to overcome the habits which are acquired early and which he clings to her through youth and early manhood may succeed in being perfectly

The next patient operated on here is one month of age. She speaks English, French and German. Her articulation is absolutely perfect. Her command of these languages is such that one could suspect that she never had cleft palate. The young lady feels that she escaped the acquiring of defective speech because she was operated on before she was old enough to begin to talk.

The third patient was operated on when three months of age. In this case there was a broad cleft of the entire palate with hare lip and the nose was deflected to the side opposite the cleft. On examination you will see that the dental arch is so well formed that one could scarcely realize he had hare lip, and you will see that he has normal nostrils and his nose is straight. If he has normal speech. It would be hard to convince the mother of this boy that it would be wise to defer operation for cleft palate until the child old enough to talk. If teeth occlude well he has but one tooth absent and that is the lateral on the side of the cleft which never erupted. As you know this tooth is often absent in cleft palate patients. If present, it is so much directed from its proper position that it has little usefulness. This little boy is now eleven years old. He has made excellent progress in school and he is one of the best formed boys of his age that I have ever met.

I answer to question that has been asked regarding the disturbing of teeth in moving these parts together. I would say that in my earlier experience I did disturb teeth carrying sutures through. I later found that careful manipulation at the point of the needle came in contact would enable the operator to carry the needle between the teeth and by so doing avoid disturbing them.



CORRESPONDENCE

CONTROLLING HÆMORRHAGE AFTER SUPRAPUBIC PROSTATECTOMY

To the Editor My attention has been called to an article in the November number of *SURGERY GYNECOLOGY AND OBSTETRICS* on A New Method of Controlling Hæmorrhage Following Suprapubic Prostatectomy by Dr F R Hagner

In 1903 I devised a rubber bag and used it in exactly the manner described in this article I am sending you a copy of the *New England Medical Gazette* of the issue of August 1906 containing my paper entitled A Method of Controlling the Bleeding after Suprapubic Prostatectomy I am also sending you a reprint of my article entitled The Suprapubic Prostatectomy with a Positive Method of Controlling Hæmorrhage which appeared in the *Journal of Surgery Gynecology and Obstetrics* July 1908 This paper was read before the New York Homœopathic Medical Society on or about April 10 1908

I also desire to call to your attention Mumford's Practice of Surgery (1910) page 422 where you will find the following sentence If the hæmorrhage does not cease shortly with copious irrigation one may well employ the hæmostatic tube or bulb devised by J E Briggs and shown in the accompanying cuts The cuts which appear Figs 253 and 254 are however not illustrations of my hæmostatic bag, but of one by Dr Horace Packard

The rubber bag as constructed by me is made of thin rubber capable of considerable distention and varies in size from one to one and one half inches in diameter slightly oval in shape To either pole of this bag a rubber tube is attached one being continuous with the interior of the bag the other is allowed to protrude through the suprapubic drainage opening and is of assistance in removing the bag An olive pointed bougie is introduced through the urethra and allowed to protrude through the suprapubic incision The end of the tube which is continuous with the interior of the bag is slipped over the point of the bougie which is then withdrawn through the urethra The collapsed bag is pushed into the bladder a syringe nozzle is applied to the tube and the bag is distended with water or air

The mucous membrane which originally over

laid the prostate is pushed into the cavity with the index finger approximating the mucous membrane to the underlying connective tissue Continuous tension upon the tube holds the bag in position and stops bleeding

Boston Massachusetts

J EMMONS BRIGGS

SUPPURATIVE APPENDICITIS POST OPERATIVE HÆMORRHAGE

To the Editor In *SURGERY GYNECOLOGY AND OBSTETRICS* for November 1914 page 679 I was much interested in Dr White's article on Post-Operative Hæmorrhage in Appendicitis Necrotica Recently I have had a similar case which brought this article forcibly to mind

A Case age 24 years married laborer was seen by me October 5 914 at 6 30 P M Diagnosis acute gangrenous appendix I advised immediate operation Operated as soon as he reached the hospital On opening the abdomen I waited off a preparation for possible pus I found after considerable effort a short thick gangrenous appendix with pus oozing from its tip, bound down to bed of adhesions with part of the omentum adherent After removal of the appendix I sutured the wound which was perfectly dry As a precaution I wicked with cigarette drain At midnight three hours later the nurse informed me of free blood & pulse 25 moderate thirst I ordered fresh & cold drinks and elevation of the foot of the bed The bleeding continued till the fifth day when I removed the wicks and used iodoforn gauze packings placed firmly in the wick holes After this the bleeding stopped A fecal fistula developed I began irrigating the sixth day with sterile salt solution and in the evening gave red hat was apparently a piece of necrotic omentum that was closed uneventfully recovery

Now in this case instead of the deep epigastric artery being involved I am much inclined to think I tried to deal with a case of omental hæmorrhage due to a necrotic area In my experience with gangrenous appendix cases and also from the observations of other surgeons I know we get more post-operative hæmorrhages from the adherent or gangrenous omentum than from the erosion of the deep epigastric artery Granted that the deep epigastric artery does erode from the placing of a drain or other causes yet it is so very rare in the experience of most surgeons that I am inclined to think that Dr White's technique of always tying off the artery unnecessary and apt to increase the morbidity and mortality of necrotic appendicitis cases

Wm G WARD
Lynn Massachusetts

So far as the thyroid gland is concerned I have a profound respect for Basedow's disease. I do not like these cases and there is no truth in the statement so far as I can see that the patients who have died have had enlarged thymus gland. I have seen them myself at the post mortem table. At time they did have thymus glands but when you take those cases that have a pulse of 180 with a tremor, exophthalmos, tachycardia and dilated heart they have shown no enlarged thymus gland. I regard that a sufficient evidence that it is unnecessary to classify those cases that die as cases having enlarged thymus gland. I do not believe that there is any proof how to date by the various experiments that there is a relation between the thymus gland and the thyroid any more than there is a relation between the parathyroid and the thyroid gland. These glands as far as I can see have distinct functions of their own whatever these functions may be. Sometime ago I came across a case in which the parathyroid was the seat of disease and I have the sections of that case. My experience has been so limited that I have come to no conclusions and I agree with Dr Lewis that from the experiments that have been made there is no clinical evidence to show that there is a distinct relation between the thymus gland and the thyroid.

DR CHARLES A. PARKER: As to the relation between the thymus and the thyroid I do not possess any knowledge that has not been given out here to night. The first attempt at taking out the thymus in an adult was made by Garré in 1910. He removed the thymus first from an adult in June, 1910 in stead of operating upon the goiter in a case of exophthalmos. He claimed the blood picture was changed and the blood became normal but in the course of 15 months the blood picture changed again and it was necessary to operate upon the thyroid. So far as I know that was the first adult thymectomy. There have been a number of these operation performed since.

I wish to say a few words in regard to thymectomy itself. The operation is done through a median line incision from five to six centimeters long the lower part extending below the upper margin of the sternum so that this upper margin is exposed and is a definite landmark in the field then spreading the muscles and fascia down to the pretracheal tissues. I did this operation several times on the cadaver in order to make myself familiar with the technique and it came out quite the same in the living subject as in the cadaver in fact much better because I saw two

little processes of fat about half the size of my little finger about four millimeters in diameter coming up and going down regularly with the respiration. There were yellow masses of fat looking like omentum within a hernial sac or within the peritoneum. This was opened and in catching hold of the fat it herniated through just as nicely as omentum herniates through a laparotomy wound. It was a movement that you can get only in the living subject because after death the tissues are hardened they are not so easily moved and you cannot remove the thymus without tearing it apart.

In the case I mentioned I had the pathologist go over it afterward and he reported that it was thymus gland. It weighed about nine grams. Those who have had to do with the ligation of vessels know that it does not make much difference whether you ligate or do not ligate when the vessels are fine and the gland tears easily.

Another method of operating has been through a transverse incision. The first operation by the Mayo was done through a transverse incision two or three years ago. Any incision can be used but I think the upper margin of the sternum is the safest landmark because that is bony and you can go in back of it and without any further cutting simply separate the tissues. In the *10th Edition of Diseases of Children* I have published the different stages of the operation.

In regard to pressure of the thymus the first case was operated by Rehn in 1896 and in that case he put in an intubation tube and relieved the obstruction. Whenever the tube was taken out the obstruction would recur. When the tube was reinserted the obstruction was relieved but the removal of the thymus relieved the obstruction permanently. He did what was called exothymectomy that is he partially removed the thymus, opened the capsule and brought it up in the neck. He was afraid to remove the whole gland. In the case of this little child it was demonstrated by percussion by Dr. Joseph Miller some years ago over a year after the operation, that the child had a thymus of the normal size of a child of his age yet it was very evident that quite a complete thymus was removed but not all of it. We have no slides of the thymus removed but I think the report of the pathologist can be relied on which is to the effect that it is a definite thymus.

In this country Cheever Jackson of Pittsburgh first demonstrated by the bronchoscope that there was pressure upon the trachea and I think he did at first an intubation. He was the first man in this country to remove the thy-

mus gland. The patient contracted diphtheria but lived. The operation was done by him in 1907. Several others have done it since and the mortality out of fifty cases I collected a year ago was seventeen, none dying during the operation or within possibly a day or two after operation. Then came various deaths from infection and from some mistake in diagnosis in which there were broken-down tracheobronchial glands. These would have to be properly analyzed to see whether the operation was serious or not. The practical operative effort of removing the thymus is much simpler and easier than removing the thyroid.

DR. HARRY JACKSON. We have been taught that the thymus gland begins to atrophy at two years of age and that at the age of puberty merely a rest of the thymus remains. In some cases however the thymus is persistent and the lymph gland of the body enlarge and a condition known as a true thymolympaticus results.

Within the past few years certain experiments and clinical observation have shown that the thymus may become hyperplastic from the embryonic test and assume quite large proportions in the lymph glands of the body remaining normal; this hyperplastic thymus may set up clinical symptoms of tracheitis and lymphocytosis in exophthalmic goiter cases and be responsible for the sudden death that occurs in the old of cases.

A chest has shown that the hyperplastic thymus differ from the persistent thymus in that in the latter the normal relation of the cortex and medulla remains while in the hyperplastic thymus which I saw from the embryonic rest the thymus is made up almost entirely of medullary while the cortex is hardly present at all and the corpuscles of the cells have undergone marked fatty degeneration and atrophy. I have found hyperplastic thymus in two or three cases within the last year and as I have come to look for it at autopsy in older cases.

Klose has commented on this relationship in exophthalmic goiter and suggests that the thy-mus is responsible for the lymphocytosis and tachycardia the two symptom which are often persistent after the excision of the thyroid gland in exophthalmic goiter operations and Halsted¹ has recently shown that if these cases are sub-mitted to the X ray the thymus region being the part exposed that the lymphocyte count is rapidly reduced and also the tachycardia. Klose shows that the thymus is very rapidly reduced in size under X ray treatment so rapidly that he advises against its use in very young children. Halsted reports good results with the use of the X ray in these cases after the removal of part of the thyroid gland.

I want to show another thymus which weighed sixty grams from a young man of twenty who had an enlarged hypophysis. I show this in order to emphasize the point which Dr Lewis brought out that we are dealing with a polyglandular syndrome and the thymus may be enlarged in disease of other gland than the thyroid.

Here is a case of which I have not been able to find many in the literature in which the thymus was greatly hyperplastic. The boy is twenty years of age and died of symptom of pressure from an enlarged thymus.

Dr. TROY B. RILEY: I did not expect to be a help - say anything on this subject. I have been fortunate enough to see the thymic gland of about two hundred children at autopsy. I was not the pathologist who did the work for Dr. Parker although I saw the specimen after he had removed the gland. The weight was about one gram.

In two cases operated on by Dr. Bluford at the Children Memorial Hospital there is special interest in the fact that evidence of thymic atrophy was well marked and also in the fact that just a few months before the operation the weight of the two glands were comparatively small. We have the glands in the museum and they do not impress you at all as enlarged thymic glands. The weight of one of the glands was 1 gram, the weight of the other was 1.5 grams. The glands of these children were very small. The glands of these glands as they are called at present were a rule a little bigger than a little pink and that is all I have been able to see with the microscope operation. Histological preparation of the glands after operation than the usual thymic sections.

the interesting feature in the work is the
the object of the research is to determine the

as to what is the normal maximum weight of the thymus gland. One authority gives the maximum weight of an enlarged thymus gland as thirty grams another gives it as sixteen and another considers seven grams as quite normal these figures being for children up to the age of two. The largest we have seen in any child at autopsy weighed sixteen grams. It was in a case of clear cut so-called thymic death and an interesting feature in this particular case was the fact that marked pressure upon the large veins at the base of the heart and the lungs had been made by an enlarged gland. This pressure had resulted in marked cyanosis of the lungs and subpleural and subperitoneal tissues, which is strong support for the idea that a great deal of the trouble due to this gland may be the result of pressure upon the vessels at the base of the heart and hilum of the lungs. There are other authorities who believe that status lymphaticus is a toxic affair. But we have another interesting case which would seem to me to align the thymus gland more with the lymphoid tissues of the

body than with the thyroid gland. It was a case of streptococcic cellulitis of the neck in which there was brawny induration of all the tissues of the neck with rapid extension downward through the gland of the mediastinum involving the thymus gland as well and the lymph glands in the abdomen—retroperitoneal and mesenteric. The tracheobronchial lymph gland were markedly enlarged there was an enlarged gland pressing upon the common bile duct and in consequence an enlarged and tense gall bladder and I particularly noticed the thyroid gland in this case to see if it also had become involved in this rapidly spreading infection. The thyroid gland was no larger than that usually observed in a child of this age two and one half years. The infected thymus gland weighed sixteen grams. In conclusion it would seem to me that Dr Lewis is right in saying that we do not really know what relation if any the thymus bears to the thyroid. Our actual knowledge of the physiology and pathology of this gland is as yet not definite enough to be of final value.

BOOK REVIEWS

A CRITIQUE OF NEW BOOKS IN SURGERY

By MAJOR C. SELLIG M. D. SAINT LOUIS, MISSOURI

THERE has been much speculation in the public press regarding the economic effects of the European war. Of course Europe will of necessity require quantities of the great American staple—cotton and since to day just as in the Napoleonic era armies still travel on their bellies we shall be looked to as the great visible source of supply for corn wheat and meat. And an fitting sense of the amenities of life has brought it about that America and Americans are not flouting this fortunate reversal of the balance of trade. The possible increase of exports has almost been relegated to a side issue and attention has been riveted rather upon the diminishing imports. And unless he stops to think one hardly realizes how crippling this fall of imports is. In our own work for instance we shall have to content ourselves with the thought that American medical volumes in medical journals are fully self sustaining even to the most critical reader. It is hardly to be hoped that the cut in our supply of foreign literature will in any way stimulate American productivity. With trade and commerce it is a very different proposition for here the goal of competition and its attainment is important factors. In the quality of the product in a very large measure depends on the inheritance of the individual to which and to know the divine status of the truth is his.

The influence of criticism and her medical in the world has been most stimulating not only to American work but to those of all other nations. Undoubtedly there will be a falling off of it in the quietude of the present product particularly in the last few years of time. We shall perhaps then be left to our own devices with our own needs. As the matter stands it is of course too early to indulge in prophecy.

It is safe to say that to attempt to estimate the book for its own sake is of how the do or how they feel is the with the of its mental stimulus but in this case all the book the more with the angle except it are born product. One should avoid the hope that it will not be a hard hit as commerce has been and that it will be a resourceful in comparing her losses.

WITH American medicine in mind as a central thought the volume from the Mayo Clinic has a special interest for us in that it mirrors a distinctly new tendency. The book is a stout compilation of some eight hundred odd pages devoted to papers written by twenty eight different contributors and covering various aspects of surgery clinical technical pathological radiological chemical and physiological. The papers are grouped under the subheads: Alimentary Canal, Urogenital Organs, Ductless Glands, Head, Trunk, and Extremities, Technique and General Papers. It goes without saying that scarcely any reviewer possesses the requisite temerity to attempt to set down in print crystallized judgment on an array of seventy odd papers. He could not do so within limited space in fairness either to himself or to the authors and in this particular instance there need be no qualms of conscience about the matter for all the papers have been published separately before thus permitting almost every one to have reached his own mature conclusion even before the book fell under the eye of the reviewer.

But we can do better than furnish the always more or less insignificant expression of personal opinion by pointing out the message delivered by the book—a message which we have characterized above as a tendency and which the knowing ones in America are already beginning to recognize as something to be thrust out most carefully in its relation both to the practical and the educational phases of medicine. We refer to what for a better phrase we may call operative medicine that is, the adjustment coordination and direction of multiple individual efforts toward the central fusion point of practical or scientific efficiency. That is what the Mayo Clinic stands for in nothing could express the trend more clearly—or indeed more excellently than does the volume in hand.

Whether such cooperative plans could be carried through by others than these rare types of individuals gifted with exceptional executive capacity, knowledge of men and driving force whether such plans of cooperation do not foster rather a bulk of work than the fundamental idea of a broad comprehensive personal grasp of the phenomena

Collected Papers by the Staff of the Mayo Hospital Mayo Clinic
(3) Philadelphia and London W. B. Saunders Company

of disease and whether they do or do not in a measure violate the important idea of freedom of effort—freedom of effort we mean in the university sense—all these are problems no less settled than they are interesting. And from the point of view that these very problems are raised by the work of a group of American investigators we have further evidence that there is much at home to busy ourselves with even if our foreign stimulus be entirely cut off.

If any one who knew the activities and tendencies of Dr. Mumford were asked to state what kind of a volume on surgical practice he would turn out the answer would probably be a book characterized by charm of style and a novel point of view. Such a prophecy is well borne out by the volume before us. The book is the expression of many years of practical work, both as a surgeon and as a teacher and is therefore eminently personal in tone, ringing a clear didactic note throughout. And yet in spite of its didactic character the material is so presented as to make an equally strong appeal both to the practitioner and to the student. Mumford realized at the outset that it was a fairly impossible task to present adequately in a single volume the usual amount of material that is crowded to a book under the title of

Principles and Practice of Surgery; he has therefore omitted the usual formal discussion of the principles of surgery except where such a discussion seemed to him to be very necessary. In reaching this decision he was we believe moved by the wisest counsel. He left the beaten path he strayed farthest afield and planned his work so that he might describe a typical disease, the order of their general interest, importance and frequency.

The result of his plan is a volume of a thousand pages divided into seven parts devoted to the abdomen, femoral system, organs, genital organs, the chest, the face and neck, the head and spine, minor surgery and diseases of structure. Each of these various parts is divided into chapters under which the different diseases are taken up in order. The striking value of Mumford's discussion of disease centers in his lively and yet well clear expository style. And we mention this particularly because in the review we are more or less concerned with those American characteristics on which we may be forced to depend during the last months of the year. The supply from broad English medical men unduly practiced a grace and clarity of style that contrasted rather sharply with our own deficiencies in this direction. Mumford points the way to better things; a less invidious comparison. What minor deficiencies there are in the book are more than compensated for by the general make-up of the volume which may be characterized as adequate stimulating and refreshing—a worthy American product.

THE PRACTICE OF SURGERY. By James Gregory Mumford, M.D. Second Edition. Philadelphia and London: W. B. Saunders Company, 1914.

ANYTHING from the pen of Dr. John B. Murphy is usually and properly regarded as a type of the best American product. He fortunately however, once felt himself forced to begin his critique of Murphy's last two volumes of

The Clinician with the famous introductory words used by Lord Jeffrey in reviewing an early volume of Wordsworth's poems, namely: "This will never do. It will never do for Dr. Murphy to allow his publishers to advertise. Why in the April and June numbers you get a sure means of differentiating appendicitis, hemorrhoiditis and ascending urinary infection. Dr. Murphy certainly knows that there is no other means of making such a differentiation. It will never do to illustrate the fact that a wheel is made up of rim, spokes and felly by a rather pretentious full page drawing showing a dismantled wheel. It will never do to refer to the fat putting action of trypan in (April Clinician p. 56) or to describe an abdominal palpation locating it between Albany and Troy (June Clinician p. 441). It will never do for Dr. Murphy to hold a most excellent talk on

Surgical Diagnosis by a description in small print of how a medical student interlocutor should, "What shall I matter with Murphy?" and how the class shall be treated. He is all right. Of course all this—that is, all except the ill-advised criticism—is merely evidence of bad editing and is therefore easily corrected.

The more difficult problems confronting Dr. Murphy is what he mentioned before consists in arranging his subject matter so that the interest of his readers will not flag. For instance in the two volumes of The Clinician under review the subject matter is almost identical with that which has been presented before and in some instances more than once before. This criticism of course does not militate against the absolute excellence of these and all his volumes. They mirror very clearly Dr. Murphy's usual brilliance and enthusiasm. But even those of us who realize the impossibility of diversifying the presentation of clinical material in the first month look forward to the variety of subjects. It is necessary to this point to make special mention of the dramatic discussion of a typhoid of the jaw in the June Clinician with a full description of Murphy's operation of arthroplasty illustrated with excellent drawings by Tom Jones.

THIS little volume by Neff is typically American—concrete and unqualifyingly practical. There are in all fourteen chapters devoted to the general preparation of the patient, the surgeon, hands, the field of operation, the tools and instrument used, and the handling of aseptic suture material, anesthesia, etc., on the course of operation, the after care and treatment of unclean wounds. The value of the monograph is enhanced

THE CLINIC OF JOHN B. MURPHY, M.D. April and June. Philadelphia and London: W. B. Saunders Company. GROSS' PRACTICE IN SURGERY. Practice by Frederick Emil Neef. New York: Surgery Publishing Company, 1914.

by the facts both that it expresses so clearly the individual viewpoint of the author and yet furmishes when possible a scientific basis for the various personal preferences. This is admirably illustrated by Neef's discussion of his method of preparing the field of operation and also by the few pages that he devotes to the subject of wound healing.

We have always objected to marginal notes in red ink as adding very little save flamboyancy to a volume but in this little book the marginal notes serve a useful purpose and do not seem to be noticeably obtrusive.

THIS volume by Ely suffers by contrast with that incomparable book on Joint Tuberculosis published by him in 1911. In the earlier volume Ely had an imperative message to deliver and he fulfilled the task most adequately thus verifying our statement just made that a high quality of product is proportioned to the individual enthusiasm to seek and know. In this volume now under review there is no strikingly personal note and there is much to warrant the misgivings which Ely himself frankly admits in his preface. On the other hand Ely is clearly conscious of the fact that he has only skimmed the surface and gives as his reason for so doing his desire to present to the general practitioner in small compass general principles that are evolving from modern clinical and laboratory investigation.

The first chapter gives a terse summary of the rational basis anatomical physiological and pathological of bone and joint disease. This chapter is short but its value can only be estimated in terms of the number of general practitioners who read it and the discrimination with which they read. Eight other chapters are devoted to acute and chronic arthritis ankylosis acute and chronic osteomyelitis and the new-growths of bone.

THE monograph by Sorrel is the only foreign volume of the month. As one reads the book however one almost forgets its Gallic origin in noting the hearty accord with the theory and doctrine of the Englishman Lane regarding intestinal stasis. Some of us subscribe to the theories of Lane and some of us are more prone to agree with Sir James Goodhart's quaint dictum that "What is a kink to us is not necessarily a kink to the intestine but at all events full credit must be accorded Sorrel for having presented the entire subject of intestinal stasis *secundum a tem*."

In two introductory chapters the author covers the history of the subject and the embryology of the large intestine. The two succeeding chapters dis-

cuss the anatomy and physiology of the cæcum appendix and large intestine. The position of the appendix mobility of the cæcum rotation and descent of the bowel anomalies of the sigmoid pericolic membranes and ligamentous fixations are presented in detail and well illustrated in the chapter devoted to anatomy. The chapter on physiology furnishes a particularly lucid account of peristalsis and antiperistalsis with an excellently selective set of bibliographic references. The etiology pathologic anatomy symptomatology diagnosis and treatment of intestinal stasis are elaborated under separate chapter heads the volume closing with a terse set of conclusions a full set of case histories and an extensive bibliography covering twenty odd pages. Under the head of pathology Sorrel shows that in addition to the ordinary type of stasis due to ptosis atony and megacolon there are other types due to purely local conditions such as Lane's kink mobile cæcum pericolic membranes splenic flexure fixation and angulation and obstruction of the sigmoid.

An outline even as sketchy as the one we furnish is really all that is necessary as a guide for those who are interested in the subject. A book review is not an appropriate place to enter the lists with tilted lance on a subject as problematic as is the broad question of intestinal stasis. And yet one cannot lay the volume down without a comment to the effect that the book by Sorrel confirms the opinion born of reading the work of most other investigators in this field namely that when it comes to religion and intestinal stasis every man has his bias.

If we only knew what the phrase chronic intestinal stasis as used by Lane and Sorrel really connotes! Certainly Sorrel nowhere in his volume furnishes us with this information. He argues rather naively when he says "The theory of Lane which seemed singularly bold at first is now concurred in by many surgeons of high repute behind whose authority I trench myself. Moreover recent anatomical studies lend strength to the probability of the correctness of the theory. If one admits that the theory is correct then one must admit the relationship existing between chronic stasis and accidents toxo-infectieux (p. 121). Both Lane and Sorrel fail to work out a satisfactorily specific symptom complex characteristic of intestinal stasis and certainly the therapeutic procedures aimed at correcting the so called stasis have not always been satisfactorily corrective. And that is not all more's the pity. Many of us do not know and many of us who do know forget that in an abortive dynamic attempt to overcome stasis surgically we often convert a compromised individual into an actually invalidated member of society. Furthermore see how easily after all one drifts into the lists even when one has deliberately set about to be a neutral onlooker.

of disease and whether they do or do not in a measure violate the important idea of freedom of effort—freedom of effort we mean in the university sense—all these are problems no less settled than they are interesting. And from the point of view that these very problems are raised by the work of a group of American investigators we have further evidence that there is much at home to busy ourselves with even if our foreign stimulus be entirely cut off.

If any one who knew the activities and tendencies of Dr. Mumford were asked to state what kind of a volume on surgical practice he would turn out the answer would probably be "A book characterized by charm of style and a novel point of view." Such a prophecy is well borne out by the volume before us. The book is the expression of many years of practical work both as a surgeon and a teacher and is therefore admirably personal in tone ringing a clear didactic note throughout. And yet in spite of its highly characteristic material is so presented as to make an equally strong appeal both to the practitioner and to the student. Mumford realized at the outset that it was a fairly impossible task to present adequately in a single volume the usual amount of material that is crowded into a book under the title of "Principles and Practice of Surgery." He has therefore omitted the usual formal discussion of the principles of surgery except where such a discussion seemed to him to be very necessary. In reaching this decision he was well advised by the wisest counsel. He left the beaten path he strayed further afield and planned his work so that he might describe surgical diseases in the order of their surgical interest, importance and frequency.

The result of his plan is a volume of thousand pages divided to seven parts devoted to the abdomen, female generative organs, genitourinary organs, the chest, the face and neck, the head, spine, minor surgery and diseases of structure. Each of these various parts is divided into chapters under which the different diseases are taken up in due order. The striking value of Mumford's discussion of disease centers in his highly distinctive clear expository style. And we mention this particularly because in this review we are more or less centering on those American characteristics on which we may be forced to depend during these months of diminished supply from broad English medical men and ably practice a grace and clarity of style that contrasts rather sharply with our own deficiencies in this direction. Mumford points the way to better things and less vicious comparisons. What minor deficiencies there are in the book are more than compensated for by the general make-up of the volume which may be characterized as adequate stimulating and refreshing—a worthy American product.

ANYTHING from the pen of Dr. John B. Murphy is usually and properly regarded as a type of the best American product. Unfortunately however one feels himself forced to begin his critique of Murphy's last two volumes of "The Clinics" with the famous introductory words used by Lord Jeffrey in reviewing an early volume of Wordsworth's poems: namely, "Thou wilt never do. It will never do for Dr. Murphy to allow his publishers to advertise. Why in the April and June numbers you get a sure measure of differential appendicitis, cholecystitis and ascending urinary infection. Dr. Murphy certainly knows that there is no sure means of making such a differentiation. It will never do to illustrate the fact that a wheel is made up of rim spokes, hub and fly by a rather pretentious full page drawing showing a dismantled wheel. It will never do to refer to the fat plugging action of trypan (April Clinic p. 296) or to describe a local pain by locating it between "Ubray" and "Troy" (June Clinic p. 441). It will never do for Dr. Murphy to hold most excellent talk on "Surgical Diagnosis" by a description in small print of how a medical student interlocutor shouts, "What's the matter with Murphy?" and how the laws reverberate. He's right. Of course all this—that is all except the ill-advised advertising—is merely evidence of bad editing and is therefore easily corrected fact.

The more difficult problem confronting Dr. Murphy as to his mentioned references consists in varying his subject matter so that the interest of his readers will not flag. For instance in the two volumes of the Clinics under review the subject matter almost identical with that which has been presented before. In some instances more than a brief reference to criticism of course does not militate against the essential excellencies of these dual volume. They mirror very clearly Dr. Murphy's usual brilliant and enthusiastic. But even those few who realize the impossibility of diversifying the presentation of clinical material must still look for novelty despite our lives. It is necessary at this point to make special mention of the admirable use of ankylosis of the jaw in the June Clinics with a full description of Murphy's operation of arthroplasty illustrated with excellent drawings by T. M. Jones.

THIS little volume by Neef is typically American—concise, accurate and unqualifiedly practical. There are all fourteen chapters devoted to the general preparation of the patient for the surgical hand, the field of operation, the utensils and instrument used, wound healing, aseptic technique, anesthesia, convalescence, the course of operation, the after care and treatment of unclean wounds. The value of the monograph is enhanced

AMERICAN COLLEGE OF SURGEONS

THE THIRD CONVOCATION

THE third convocation of the American College of Surgeons was held in the Memorial Continental Hall in Washington on November sixteenth at eight o'clock. The program for the evening was as follows:

7.30—Fellows and Guest assemble.

7.40—Governors assemble

7.45—Candidates for Fellowship assemble

8.00—Regents assemble with Honorary Fellows and Guests

Invocation by His Eminence James Cardinal Gibbons
Introductory Remarks by the President J. M. T. Finney

Presentation of the Roll of Candidates for Fellowship
Conferring of Fellowships by the President

Introduction of Honorary Fellows and, finally, by the Regents and conferring of Fellowships by the President

Fellowship Address by Edward H. Bradford.

Concluding Remarks by the President

Adjournment followed by an informal reception to the Fellows and Guests by the Officers of the College

The President Dr. J. M. T. Finney in the course of his introductory remarks, announced that subscriptions to the endowment fund of one million dollars which proposition has been presented to the College at its annual meeting now amounted to approximately \$250,000. He predicted that the full sum would be easily secured before the next annual meeting in 1915.

The Secretary Dr. Franklin H. Martin before presenting the roll of candidates conveyed to the Fellows of the College a greeting from Sir Rickman Godlee, President of the Royal College of Surgeons of England who came from England at the time of the first convocation to assist in the inauguration of the American College. This greeting included the presentation of a handsome gavel which had been prepared by Sir Rickman Godlee as a gift to the College and upon which the following sentiment was inscribed:

This mallet was devised and used by Lord Lister and is presented to the American College of Surgeons by Sir Rickman Godlee then F.R.C.S. Eng. and in memory of his visit to Chicago November 1913

The President in receiving this token of friendship spoke of the great honor that Sir Rickman Godlee had conferred upon the American College of Surgeons by his visit and his address of one year ago and of his pleasure in receiving this beautiful gavel which linked us with the Royal College of Surgeons with Sir Rickman Godlee and his illustrious uncle Lord Lister and ordered that the gavel be forever preserved in the archives of the American College.

The Secretary then presented the roll of Honorary Fellows and of Fellows. The list of Fellows numbered six hundred and forty-six. Their names will appear in the annual directory which will be distributed to the Fellows.

The Honorary Fellows were then introduced in turn by members of the Board of Regents as follows:

Dudley P. Allen of Cleveland introduced by Harry M. Sherman. William C. Gorgas of Washington introduced by Charles F. Stokes. Lewis Stephen Pilcher of Brooklyn introduced by George E. Brewer. Sir Thomas George Roddick of Montreal introduced by George E. Armstrong. William White of Philadelphia introduced by Edward Martin.

The President then conferred the Honorary Fellowships.

Following the fellowship address (see p. 123) by Dr. Edward H. Bradford, Dean of Harvard University Medical School, there was an informal reception by the officers of the College to the Fellows and guests.

THE FIRST ANNUAL MEETING

The annual meeting held in the New Willard Hotel was called to order by the President Dr. J. M. T. Finney at 3 P. M.

DR. FINNEY. The first order of business is the appointment of a number of committees. These committees will please assemble here on the left

of the platform as the names are called, organize and be ready to make their reports before the close of the meeting.

Nominating Committee. Dr. James E. Moore of Minneapolis. Dr. Hubert A. Royster of Raleigh. Dr. Frank F. Simpson of Pittsburgh.

1111 Blackfriars London E C and say sm 11 a list
ments required in them & if he had

The intention is that the work of the committee shall
develop a the conditions in Belgium permit and that
the work shall be associated with corresponding effort
in Great Britain and Ireland in the United States and
other countries which are not trials or allies in the war

The American committee will undoubtedly
operate through the relief committees of this
country that are now specially operating in
Belgium and will have its packages prepared by
instrument dealers and pharmaceutical houses of
the United States and shipped directly to their
destination

The committee of physicians who have con-
sented to act as sponsors for these contributions
is as follows

WILLIAM L. RODMAN president-elect of the
American Medical Association

JOHN B. MURPHY president of the Clinical Con-
gress of Surgeons of North America

CHARLES H. MAYO president-elect of the Clinical
Congress of Surgeons of North America

J. M. T. LINCOLN president of the American
College of Surgeons

J. RIDDLE GORRI president of Seventh Interna-
tional Congress of Obstetrics and Gynecology

GEORGE H. SIMMONS, editor of the *Journal of the
American Medical Association*

THOMAS L. STEINMAN editor of the *Medical
Record*

I. W. TAYLOR editor of the *Boston Medical and
Surgical Journal*

IRANGLIN H. MARTIN editor of *Surgey
Gynecology and Obstetrics*

HOWARD CANNING TAYLOR New York

FRANK F. SIMPSON Pittsburgh (treasurer)

Contributions can be sent directly to Dr
Frank F. Simpson 7018 Jenkins Arcade Building
Pittsburgh Pa or to the Belgian Physicians'
Relief Fund in care of the editors of the follow-
ing journal *Journal of the American Medical
Association Medical Record Boston Medical and
Surgical Journal Surgery Gynecology and
Obstetrics*

recommendation of this committee has decided to present to you for adoption the by laws as originally given and approved and as provisionally admitted with two changes. The first change is the addition of the American Institute of Homeopathy to the list of the fifteen societies named in Article IV as number sixteen of this list. The second change is in Article VIII of the by laws as to fees required to read as follows:

FEES—An initial fee of twenty five dollars shall be required of each Fellow of the College on his election to Fellowship by the Board of Regents. A fee of five dollars payable on the first day of January shall be required each year thereafter for five years. A payment of fifty dollars upon election shall relieve the Fellow of further payments.

DR FINNEY Do you move that the constitution and by laws be finally adopted with these changes?

DR COTTON Yes I make such motion.

Motion seconded and carried.

DR FINNEY The next in order is the report of the Treasurer.

DR A J OCHSNER Chicago. I wish to present the report of a certified public accountant who has examined the books of the College. [A copy of this report will be sent to each Fellow.]

It was moved and seconded that the report be accepted. Motion carried.

DR FINNEY Now are the committees ready to make their reports? First we will call for the report of the Committee on Classification of the Board of Regents.

ELECTION OF OFFICERS, REGENTS AND GOVERNORS

DR JAMES C WOOD of Cleveland. Drawings were taken this morning to establish the terms of the members of the Board of Regents. Those whose terms expire in 1914 are:

DR GEORGE E ARMSTRONG of Montreal.

DR FREDERIC J COTTON of Boston.

DR EDWARD MARTIN of Philadelphia.

DR JOHN B MURPHY of Chicago.

Those whose terms expire in 1915 are:

DR HERBERT A BRUCE of Toronto.

DR GEORGE W CRILE of Cleveland.

DR CHARLES H M of Rochester.

DR HARRY M SHERMAN of San Francisco.

Those whose terms expire in 1916 are:

DR ROBERT L McKECHNIE of Vancouver.

DR WILLIAM D HUGGARD of Nashville.

DR GEORGE L BRUNTON of New York.

DR CHARLES L STOKES of Philadelphia.

These drawings were made in this way. Three groups of four each were made up and the names placed on cards. These cards were placed in a hat and then the drawings were made. The first group taken out were for the term expiring in 1914, the second for the term expiring in 1915 and the third for the term expiring in 1916. The drawings for the Board of Governors were made in exactly the same

way. This list is a large one and with your permission I will turn it over to the Committee on Nominations without reading.

It was moved and seconded that the report be accepted. Motion carried.

DR FINNEY We will now hear the report of the Committee on Nominations for Officers and Regents.

DR JAMES E MOORE of Minneapolis. The Committee on Nominations wish you to distinctly understand that we are not trying to establish a precedent but we realize that we are still in the stage of organization that our organization is not yet complete that the present incumbents of the Board of Regents have still a thousand names not acted upon so that there is a year's work still laid out for them. Naturally it would be a bad precedent but for the present we are pleased to offer you the nomination.

For President—**DR J M T FINNEY**.

For First Vice President—**DR W W CHIPMAN**.

For Second Vice President—**DR RUDOLPH MATAS**.

For General Secretary—**DR FRANKLIN H MARTIN**.

For Treasurer—**DR A J OCHSNER**.

According to lists cast this morning the following members of the present Board of Regents retire:

DR GEORGE E ARMSTRONG of Montreal.

DR FREDERIC J COTTON of Boston.

DR EDWARD MARTIN of Philadelphia.

DR JOHN B MURPHY of Chicago.

Your committee respectfully renominates these gentlemen for the ensuing term.

It was moved and seconded that the secretary be instructed to cast a ballot for the nominations made. Motion carried.

DR FINNEY We will now have the report of the Committee on Nominations for Governors.

DR CHARLES H PFCA of New York. To replace the members of the Board of Governors who are retiring this year the Committee on Nominations reports the following names:

DR ROBERT ABBE of New York.

DR AMOS W ABBOTT of Minneapolis.

DR E WYLLIS ANDREWS of Chicago.

DR EDWARD W ARCHIBALD of Montreal.

DR CHARLES S BARON of Chicago.

DR SAMUEL C BALDWIN of Salt Lake City.

DR J M BALDY of Philadelphia.

DR WILLARD BARTLETT of St. Louis.

DR CARL BECK of Chicago.

DR L H BECKMAN of Rochester, Minnesota.

DR FREDERIC A BESLEY of Chicago.

DR ARTHUR DEAN BEAN of Chicago.

DR J F BUNNIE of Kansas City.

DR DOUGLAS RUSSELL of New York.

DR JOHN BAPT BLAKE of Boston.

DR R J BLANCHARD of Winnipeg.

DR JOSEPH C BLOODGOOD of Baltimore.

DR RUPERT BLUE of Washington.

DR HERMANN J BOLDT of New York.

DR JOHN W BOYCE of Washington.

DR GEORGE E BREWER of New York.

Committee on Classifications for the Board of Governors and Regents Dr. A. J. Morgan of New York Dr. J. C. McCoy of Laterson Dr. James C. Wool of Cleveland

Nominating Committee for the Board of Governors Dr. Charles H. Leck of New York Dr. Gilbert L. Serman of Milwaukee Dr. Donald A. Livingston of Montreal

The next order of business is the report of the Committee on Examination. You know that we must now proceed on the examination has as regards all candidates for fellowships and applications were filed after November first of this year. We are all interested of course in the character of that examination. A great deal of thought and consideration have been given to it all going to ask Dr. Edward Maria of Philadelphia the chairman of that committee to report the results.

Dr. Maria: Your committee begs to submit the following tentative scheme for admission to the American College of Surgeons. On and after November 1, 1914, the analysis of applicants on the American College of Surgeons in addition to the following conditions previously stated: that he shall have been graduated from a medical school for not less than five years and shall present a degree of personal proficiency in peripheral and surgical lines shall be required to qualify for the Committee on Examination.

1. Evidence that applicant has served at least one year as a hospital interne and three years as assistant or one year as first assistant to a region of recognized ability and with an adequate hospital service. From those who were graduated before 1915 an equivalent surgical experience shall be acceptable of equal importance being attached to laboratory and research work.

2. Evidence that he has visited other surgical clinics and laboratories than those to which he has been officially appointed giving the dates of such visits the time spent and a brief summary of the work witnessed performed.

3. An abstract of at least fifty consecutive major operations which he has himself performed this abstract to contain the name and address of the doctor or consultant referring the case the preoperative diagnosis the anesthetic given by whom the quality and the method of administration the type of operation a brief description of the operative procedure the time required for its performance calculated from the first incision to the beginning of the application of the dressing the postoperative course and a mention of complications if such occurred not only those conditions usually classed as such but consecutive bleeding which calls for measures directed toward its control hematoma of sufficient extent to require evacuation or drainage or suppuration as slight even as a stitch abscess are to be regarded as complications. The condition on discharge from the hospital with subsequent course of the case up to the date of application for membership or as near this as is practicable. The applicant

shall supplement his individual report of operations by a further abstract report of at least fifty cases in which he has acted as assistant.

4. All applicants for Fellowship to the American College of Surgeons whose date of graduation is 1910 or later shall be graduates from medical schools in which shall have been made one of its matriculates two years of college training or the equivalent including biology chemistry and physics. If the candidate shall fail of graduation he is not accepted by the American College of Surgeons he shall be required to pass a technical examination.

Surgeons who have received by the professorial leaders of progress and exponents of finished technique by a unanimous vote of the Board of Regents may be admitted to fellowship on recommendation of the Committee on Examination.

Dr. FERRY: You have heard the report of the Committee on Examination. I wish we had time to answer questions upon these various reports but we have tried as far as possible to make them so plain and so distinct that they would require little explanation. If anybody has a doubt, his mind I am going to allow a few moments, but a very few moments for the answering of questions. If anybody really has a doubt in his mind and wants information we will try to supply it if he will so please. (Pause of questions asked.) I think when you will have had time to read this report carefully that you will see that it requires little explanation. There are no questions we will go on to the next order of business. The report of the Committee on Internal Medicine. I will ask Dr. Charles L. Stokes of Philadelphia the chairman of that committee to make his report.

Dr. STOKES: I wish to report that it is the sense of the committee on permanent site for the College that the site of the College should be selected as the permanent home. We have not had time to discuss it more upon a subject which we viewed neither for or not for from here which we look upon with favor. Thus far no definite action has been taken. (Applause.)

Dr. FERRY: There seems to be little doubt that the permanent site almost unanimously, of the College of Surgeons has been in favor of Washington. (Applause.) There was some difference of opinion in the beginning but as time has gone on it seems to have been lessened until at the present time there seems to be very little difference of opinion on that point. As the chairman has indicated a number of possibilities have been considered. At the present time you have just heard the chairman's report — that has not yet been determined just what form or just what exact location the permanent home will take.

The next order of business is miscellaneous business. I am going to call upon the chairman of the Committee on Revision of the Constitution and By-Laws, Dr. Frederic J. Cotton of Boston to make his report.

Dr. COTTON: The Board of Regents, on the

forces if the objectors with their irrelevant or unimportant criticisms, were to be successfully silenced.

By pursuing with all our might our own business we have found no opportunity to reply to our critics and time alone must justify the wisdom of our course.

We can now boast of 2 700 members a charter list which will be easily increased to three thousand when the application now on file are carefully sifted. One Fellow of the American College of Surgeons to each 36,000 inhabitants of our continent will be none too many with which to begin our campaign.

We enter our administrative period with our finances solvent and a substantial bank account with which to start our work.

INTROSPECTION

Now that we have so successfully laid the foundation of our organization by so nearly completing our list of charter members and have formulated tentative plans for our future administration what does it all mean to us? How many mistakes have we committed? As officials and committeemen who have had to deal with the inspection of credentials of all these men have we been broad generous, and judicious in our decisions? Have we been reasonably successful in avoiding the sins born of provincialism of complacency of abuse of entrenched power of social exclusiveness of envy and jealousy of selfishness, and of local prejudice?

In anxiously watching our College develop at times I have been apprehensive that some of these unworthy things were creeping in. Careful investigation and more time for consideration have almost invariably proved my fears to be without foundation. Dr. Ochsner and myself being the only officials of the College who know the personnel of the committees on credentials of the states and provinces can heartily testify to the almost faultless work that has been accomplished. Mistakes have been made. The highest judicial courts of our nation make mistakes because they like us are human but I believe that no group of men has ever worked with greater unselfishness or with higher devotion to a cause than have the Officers, the Regents and the Credential Committeemen of this organization.

What now of the rank and file of our College. Are we to look upon this fellowship as we would look upon a membership in a social club or guild. Are we to be satisfied to treat it as another surgical society to which we are to pay dues and in a spirit of self satisfaction now that we are in stop work? Are we to treat it as an ornamental honor wear its regalia assume its titles and without an effort to make it an organization of character allow it to become an object of ridicule? That surely does not represent the spirit of its founders. The College of Surgeons either is a protest against pretense incompetency selfishness unpreparedness lack of character and dishonesty among men who are called surgeons or it has no reason for existence.

Everyone of us has been asked to make a vow of loyalty to the organization that vow means sacrifice. Our creed is broad enough to reach a vulnerable point in the armor of each one of us. Do we intend to keep our vows or have we subscribed to them as a matter of form believing that the application is to be made to our associates only?

We have emphasized one article of our creed by asking that a separate and distinct pledge be made to it. Fee-splitting for which this special pledge is prepared is the one evil of commercialism that can be eradicated most easily from this organization because of its barbaric crudity. The practice of commercial sins that require the subtlety and finesse born of breeding education and a knowledge of the world will be the most difficult for us to stamp out.

To pursue the practice of surgery with thorough self restraint to place the welfare of our patients above all else to regard scrupulously the interests of our professional brethren and seek their counsel when in doubt of our own judgment as far as able to avoid the sins of selfishness to shun unwarranted publicity dishonest money seeking and commercialism to make our fees commensurate with the service rendered and within the patient's rights and to avoid discrediting our associates by taking unwarranted compensation.

These also are our pledges. These are the articles of the contract we have entered into between ourselves, and that we have published to the lay and professional world as our standards of action. There is no article of that contract that will not hit some one of us very hard no one of us can escape them all. It is like a prayer—easy to utter but difficult to live up to but like a prayer or any other ideal if we succeed in placing ourselves in alliance with it it will make for character satisfaction and advancement.

It will not do for a few idealists to adhere to the letter and the spirit of each article of the creed of the American College of Surgeons and allow the rank and file to ignore them. If the College is to be a real moral and educational force it must enforce promptly and definitely its own declaration of principles among its Fellows, then its Fellows may hold up their heads and fearlessly do the work that it has laid out for them to do.

PROSPECTIVE

We have now reached in the history of our organization the stage of administration and development. We are about to put into execution a method of admitting the future Fellows to the College.

You have learned from the report of the committee just read to you that the test of eligibility to membership will not be along the lines of simply passing a quiz examination but will consist of a plan that will bring to light the candidate's qualifications as a surgeon from the standpoint of fundamental edu-

Dr W B Brinsmade of Brooklyn
 Dr LeRoy Brown of New York
 Dr John Young Brown of St. Louis
 Dr Truman W Brophy of Chicago
 Dr Herbert A Bruce of Toronto
 Dr William Evans Bruner of Cleveland
 Dr Coleman Graves Buford of Chicago
 Dr Frank E Bunts of Cleveland
 Dr James Burry of Chicago
 Dr Henry T Byford of Chicago
 Dr Hugh Cabot of Boston
 Dr W P Carr of Washington
 Dr John G Clark of Philadelphia
 Dr Clement Cleveland of New York
 Dr E A Codman of Boston
 Dr Robert C Coffey of Portland Oregon
 Dr Royal S Copeland of New York
 Dr W L Cousins of Portland Maine
 Dr George W Crile of Cleveland
 Dr Walter G Crump of New York
 Dr Thomas S Cullen of Baltimore
 Dr E P Davis of Philadelphia
 Dr F G DuBose of Selma Alabama
 Dr J M T Finney of Baltimore
 Dr George Gellhorn of St. Louis
 Dr Burton Haseltine of Chicago
 Dr C E Sawyer of Marion Ohio
 Dr George R Southwick of Boston
 Dr DeWitt G Wilcox of Boston
 It was moved and seconded that the report be accepted. Motion carried.

Dr FINNEY Next in order is the report of the General Secretary

ADDRESS BY THE GENERAL SECRETARY

Dr FRANKLIN H MARTIN of Chicago This report will deal with three phases of the affairs of the College the past the present and the future

RETROSPECTION

Nothing in medical organization in the memory of any of us has fired the imagination of the whole profession of a continent as did the first serious announcement of the plans of the American College of Surgeons

The reasons for this were first because of the perfectly obvious fact that such an organization properly established would have a tremendous influence on the future of the surgery of America second because of the definite radical declaration of principles forecast for the organization by the founders of the College third because of the personal of the body of men who immediately squarely and unequivocally placed themselves behind the movement fourth and paramount because every surgeon of ambition imagination and enterprise realized that he desired to ally himself with such a movement

The mechanical development of the enterprise as recorded in the office of the Secretary has been a inspiration to everyone connected with the work

Three thousand applications from all parts of the continent had been dealt with before the first

convocation held a year ago three thousand letters of instruction were sent before these first papers were filed three thousand other letters acknowledging the receipt of applications followed these Fifteen thousand letters were sent to fifteen thousand men given as references in the first three thousand applications and an average of one letter in each of these fifteen thousand references was written explaining perfectly obvious instructions Letters sending in groups the lists of candidates with the references of each of the three thousand were mailed to the State Committees on Credentials of forty-eight states of the United States and the several provinces of Canada

At the same time lists of approved candidates were sent each week to each Regent for his inspection and acceptance or recommendation for reconsideration This work eventuated in approval over one thousand applications for the first convocation

Next it was necessary before the convocation to notify each of the two thousand unsuccessful candidates that his application had not been finally passed upon and as far as possible give him the reason for postponement Finally each successful candidate was notified by at least two communications of his election and requested to report at the convocation Besides this, literally a score of letters a day were sent to anxious candidates, to anxious friends of anxious candidates and personal letters elucidating instructions to committees and individuals

This brings us up to November 13, 1913

In the next six months ending with the convocation in Philadelphia as many more candidates were dealt with in the same way as did one thousand and fifty five more Fellows were added to our list

To day six months later we are to admit six hundred and forty six additional members to our fellowship still leaving two thousand candidates whose applications have not been finally considered

In all 16,646 letters and 880 telegrams have been sent from the Secretary's office and innumerable local and long distance telephone calls have been sent and received

I have summarized this mass of detail in order to illustrate the hold this movement of the College of Surgeons has upon the surgeons of America and this has been further exemplified by the interest which has been shown in progress by the official boards, by the state committees by the individual Fellows, by the surgeons and medical practitioners who have cheerfully stood as sponsors and by every secretary and employee in the executive office

While much work has been accomplished it must not be taken for granted that this has been done without the least suggestion of waste or inefficiency At the beginning the problem of organization seemed so insurmountable to the disinterested observer the forms of attack presented by the opponents of progress were so many that it soon became apparent to the organizers that the greatest possible momentum must be developed by the organization

which if properly conducted will become a power on this continent that will redound to the glory of its founders for many centuries. We have not been asked to take an examination. We are not at the beginning of a struggle for existence. We have been especially honored by the peers of our profession in a way that no other group of surgeons in our country can be honored. It is not an honor that has been welcomed by a few, but an honor that has been acceptable to the highest in our ranks and an honor that will constantly grow as our organization continues.

In order to have our organization of the greatest possible value to mankind and to have it endure without a possibility of a doubt it is very desirable that we at once put it upon a financial basis that will make it possible to do its immediate work adequately and forever place it beyond pecuniary need.

At our informal mass meeting in June we submitted a proposition to a minority of our Fellows which called for the raising of an endowment fund from among the charter members of the College of one million dollars. It was proposed that this sum should be invested in perpetuity and only the interest be used for the executive work of the organization. Each Fellow was asked to subscribe five hundred dollars. It was understood that all subscriptions should be contingent on our raising five hundred thousand dollars by December 1st of this year the first payment on the subscription to be made January 1, 1915.

One hundred and thirteen thousand dollars or subscriptions from two hundred and twenty six Fellows, were received and it was the intention to push the plan among those Fellows who were absent from the mass meeting after the summer vacations. The war decided the Regents to ask those who made subscriptions to give their mutual consent to extend the time for obtaining the subscription one year or until December 1, 1915 and the beginning for the payment of the subscription to January 1, 1916.

Our subscription plan is a promise to pay in the form of a note payable with a discretionary provision to pay in installments the entire amount at one time or to have the entire amount stand in the form of a promissory note interest to be paid on all balances at the rate of five per cent per annum.

It is further stipulated that from this pledge shall be deducted the amount of the membership fee and annual dues that have been paid at the time the pledge becomes effective.

The Board of Regents feels that this is a convenient time to give a large group of the Fellows an opportunity to sign the agreement. The bill forms of the pledges will be distributed and we feel it is hoped that they will be filled in by all of those who have not already signed them.

Personally I hope that everyone will look favorably upon this proposition. It has been with us right out by the Regents. There is no doubt that a

prompt acquiescence in the judgment of the Regents in this matter on the part of the Fellows of the College will place the organization in a position of such strength that everyone will be proud of his alliance with it. It will place it not only in a position of strength but it will make it the most independent medical organization financially speaking in existence and its security of position will be such that it will in the future attract many substantial endowments that will build its home and add to its dignity.

The sum asked for of each one of us is extremely small compared to the results sought. The aggregate amount however of two thousand subscriptions of these small pledges will sum up to a magnificent total.

A year is given the Fellows in which to become accustomed to the sacrifice. If one does not want to give the cash at the beginning a promise to pay will be quite as welcome. What is pledged in notes will not have to be invested. Remember! no one makes a better investment than when he invests in something that is the strongest thing of its kind.

If our organization with its great ideals with a desire to accomplish unusual things is without the financial capacity to execute it would have been better that it had never been conceived. On the other hand if the enterprise for which we have worked so hard and for which we have hoped so much is to occupy a practical and enduring position the result can be assured definitely if in this first year of our administration each one of us will accept the judgment of our Regents and sign the endowment pledge.

DR FRYER. With this very comprehensive report of the Secretary there is really very little left to be said but perhaps there are one or two points which might still be a little in doubt in your minds. The question is so often asked: What are you going to do with all that money? Now Dr Martin has tentatively answered that question. I say tentatively. The plans which he has suggested are those which have been and are at the present time promised in our motions. They are working bases as it were for the future. But in all probability those plans will have to be modified and modified in certain directions which do not appear at the present time. But whether they are modified or not whether the substitute is the whole plan is going to need—if it is carried through to its completion in the way in which we want it and in which it ought to be done—it is going to take money. I want to say one more word. Not one cent of the money pledged here is to be spent in bricks and mortar. We hope to be able to provide our home in some other way. The money of this endowment fund is going to be used in carrying out the ideals and the plans for which the American College of Surgeons was founded. Now get that idea fixed in your minds. In order to carry out these ideals—the standardization of surgery, the elevation of surgical practice and all

cat on professional education hospital advantages a consideration of the number of years spent in the practice of surgery with actual evidence submitted of the definite amount of work accomplished and evidence as to the class of laboratory or hospital in which the work was performed

The effect of these requirements insisted upon by us will be to place every future candidate on probation and that probationary time will have to be spent in surgical work in institutions whether private or public that will furnish modern equipment in refined methods of diagnosis care of patients laboratory and record keeping that will be acceptable to our standards

This places upon our shoulders an enormous responsibility and a corresponding power. It makes us indirectly censors of the machinery of surgeon making from the time the prospective surgeon as a student enters his literary course of study through his professional school his hospital internship his assistantship and his early years of independent practice

If our censorship is to be recognized we will have to show that we are worthy of consideration and that if fellowship in our organization is so desirable that every one of these factors in the education of a surgeon will cheerfully cooperate with us

And why shouldn't our influence be welcome? What our committee's plan contemplates when worked out in detail, is the systematic development of a surgeon to the very highest efficiency

But how futile are peace treaties submitted by a nation without power to enforce! How futile will be our proposals if we have not influence to make them desirable!

Our influence obviously must come from the layman upon whom the surgeon operates. He must be convinced that we stand for safe surgery that we are against juggling of fees unprepared operators, and inadequately equipped hospitals. After we have convinced him of these facts the American College of Surgeons will have no difficulty in maintaining its influence with colleges, universities, hospital organizations, legislators and the profession of medicine at large

The crux of our problem now is: How are we going to carry out our comprehensive plan? It seems to me first we must obtain a group of men each of whom is sympathetic with our whole problem but each of whom is particularly interested in one phase of it so much interested that he will be willing to give a certain definite amount of time to its consideration second we should place in charge of our entire educational campaign a trained educator who would be the voice of our Board of Regents and in cooperation with the group of men referred to above will like the President of a university devote his entire time to the domination of the College third the director of the College with the group of surgeons cooperating with him in the capacity of a cabinet would especially have charge of publicity matters that shall be

distribute and would constitute the Executive Board of the College

To be more definite—we should secure four surgeons of peculiar aptability chosen for a definite term of service and pledged to devote at least 12 weeks each year to the exclusive work of the College and to cooperate with the executive officer and office. One of these four men should urge upon hospitals through their lay boards and medical staffs the necessity of meeting our requirements one should be keenly interested in the problem of urging universities to comply with our standards one a trained laboratory man should prepare a minimum requirement for the surgical laboratory work to which our Fellows must conform one should critically look after the legislative measures in which surgeons should be interested. Such a strong combination as our administrative board constantly working out our problems, would succeed in keeping all questions pertaining to the College well in hand would keep in close touch with our candidates and would enlighten through the proper methods the public and the profession as to our plans and our endeavors to improve the standard of surgery

This plan which seems to be the one suggested that meets the approval of the Board of Regents, has one serious drawback. That drawback is of a kind that often figures: the conduct of enterprise, viz. inadequate financial resources

The legitimate income of the American College of Surgeons on its present basis is less than \$15,000 a year. This will little more than pay the running expenses of a very modest executive office and is far too meager to pay a salary to an executive head and per diems and traveling expenses to four competent professional men for six weeks service each year

We cannot afford to be parsimonious in the conduct of our executive affairs. We want the strongest educator possessing executive ability available for this position. When we find the man who will honor us on any occasion or at any place at which his services may be required for the College we must be prepared to offer a salary commensurate with his worth and in accordance with the dignity of the position

For some time we might drift along and obtain the services of public spirited surgeons to act in the capacity of advisors to our executive who would devote their time to our cause who would attend meetings in New York, San Francisco and Washington and who would pay the own expenses. If our association were a charitable or a religious organization or a group of superannuated pedagogues such a plan might seem proper

We are not unfortunated pedagogues but we are three thousand active professional men at the zenith of our power practicing one of the best paid branches of medicine. We have been selected from a group of thirty thousand specialists as preeminent to become the charter members of an organization,

President in the statement which he made that not one cent of this endowment fund was to be spent for bricks and mortar. I think there has been quite a general feeling among the Fellows that the proposition made at our last convocation that we were to obtain a permanent home meant that we were to build an elaborate temple or clubhouse or whatever you please to call it and although I subscribed at that time and am ready to renew the subscription now that point has stuck in my mind. I felt that that was not a necessity for us that it was not required and I am glad to know that whatever comes from this endowment fund it is to be spent for work and work only. Aside from the fact that we must have suitable quarters in which to manage the work, I understand now that no elaborate administration building will come out of this endowment fund. If this appeal were generally responded to if we were all to respond to it you would have an endowment fund of a million and a half Mr. President as I figure it and that would be all the better because I even in my feeble way can foresee that in years to come you are not only going to need an income of fifty thousand dollars but you will need perhaps an income of seventy five thousand dollars and your million and a half will secure it.

DR FINNEY. I am glad indeed that that point has been cleared up. This money is to be expended in the brick of brains and not in bricks and mortar. Are there any further remarks?

DR JOHN WESLEY LOVE Greensboro N C. I would like in a few words to sound the bugle note of enthusiasm from the rank and file of the Fellows of this College. The men who conceived and launched this organization must have had a magnificent conception of the necessities and the possibilities confronting the profession in America and they surely had a vision with a wide horizon of the achievements that may be attained by organized effort. As I sat listening to the Secretary's report and the addresses by the gentlemen who have preceded me the question arose in my mind. What does this American College of Surgeons stand for any way? Does it mean simply that we can throw out our chests and write FACS after our names? Is that the idea? Does it mean that we can meet once or twice a year at some aristocratic hotel in a great center and felicitate ourselves on being members of this exclusive organization? Hardly! I will tell you what it means. It means that that little half baked surgeon down there in your country who has such a narrow conception of his privileges of the mission of surgery that he ships part of his fee back into the general practitioner's pocket—that fellow has got to be put out of business. It means that that medical journal lying upon your desk in your office now containing questionable unethical advertisements must go into the waste basket and stay there! It means that the really great man little fellow though he be struggling with unfavorable environment shall have you put the strong arm of this American College of Surgeons

around him and say. Here brother look up come with us and we will do thee good. It means that the medical college that pays semi annual dividends and takes it out of the microscopes and other laboratory supplies its students ought to have has got to close up and stay closed! The medical college that is working to cultivate brain and not capital that is trying to build character and not great institutions per se has got to have behind it the great force of this organization and made to feel that we will stand by it forever!

But let us take a little wider view of the situation. Look just to the South of us at our sister Republic at the interminable struggle going on there with all the misery and blood shed and horror of internal strife. What chance has science for development there Mr. Chairman? Then turn your eyes to the West and look at China's untold millions that Napoleon said was a sleeping giant. What chance has science even in the domain of a giant if he be asleep? But sadden of all turn your eyes to the East and see whole continents aflame with the lust for human blood! Men women and innocent children are being shot down in the shambles like beasts in the field! Thrones trembling dynasties crumbling disorder everywhere! What chance has science there? You say. What signifies all that to us? It signifies brethren that the West (meaning America) no longer looks to the East for light but that the East is calling to the West for help! Do you not hear the Macedonian cry of heroic little Belgium to send us bread for our children or they die? If to-day they call for bread to-morrow they will call for the higher things of life. Upon us who live in this God favored land this country of watchful waiting there has been rolled a burden and a responsibility such as the world never saw. We are confronting conditions such as have never occurred before and can never be repeated.

Now as an organization as a scientific institution it is incumbent upon us to keep the lamp of science burning upon this continent. We can do that in so many ways that I cannot take time to go into details.

I have no patience with the man connected with an institution of this kind whose horoscope does not extend further than his own personal aggrandizement whose conception of his privileges does not include the welfare of his profession and an ever increasing benefit to suffering humanity! If our vision be so narrow that we do not see the possibilities that lie before us then we will not put into this movement that which is necessary to accomplish magnificent results.

Let me tell you a little story I am Mrs. Wiggs Cabbage Patch. You remember when the bride of a few months comes to Mother Wiggs crying like her heart would break because of the ugliness the stupidity the utter impossibility of the man she had married old Mother Wiggs puts her arms around her and says. Daughter my experience

that that implies—is going to take more money than we appreciate now. The more you go into this question the more there will be found yet to be done and whatever is done must be done properly, must be done by men of the highest character morally ethically intellectually. And we cannot command the services of those men without paying them adequate salaries. Just how big this organization will ultimately be the services of just how many men of this character we will need it is impossible to say now. But that we will need the services of a considerable number of men of this character we are convinced. That is going to take a large endowment because we want to live respectably that is, within our means. And our means must be adequate to begin with in order to do this. I am going to call upon Dr. Murphy to say a word to us in this connection.

ADDRESS BY DR. MURPHY

DR. JOHN B. MURPHY. No return shall be expected without an adequate investment except counterfeit. If we are to expect from this organization the fulfillment of the ideals presented to you today it must have an adequate moral and financial support. The members are expected and I am sure desire to each make a small individual sacrifice to sustain the work and colossal sacrifices have already been made by men on this platform. There is one man on this platform today whose time whose labor and whose energy already expended for this organization if priced by the average results which he obtains daily for his work in other fields would represent over twenty thousand dollars without one cent in return. I refer to Dr. Ochsner a work on the Committee on Credentials [Applause]. There is another man whose labors on the same basis would represent practically an equal amount as he has expended units of energy and time which could have been profitably disposed of for other purposes—I refer to the secretary of this organization Dr. Franklin H. Martin [Applause]. Many others whom I might mention have enthusiastically contributed the time and money to the same purpose. But it requires that type of spirit and that type of men to advance an ideal and we were fortunate—I might say we were blessed—by having these men in at the birth of this magnificent organization.

Now what do you expect in return for your investment? the endowment fund of this organization? I will not accept the term donation. Such a word does not convey the correct idea and has not the correct significance in this case. It is an investment—it is an investment in your future and an investment in the future of the surgery of this country. It is above all an investment in securing for the people who have confidence in us the highest grade of surgical service. That is the prime purpose of this investment that we will assure and refer to the people standard and character of service in the future that they have not enjoyed; the past

That is the highest ideal for which a surgeon can work. Will it be a burden on you? No! It cannot be a burden on a body of men, twenty or hundred or three thousand strong, to each pay now five hundred dollars for the permanency of this organization.

What do you receive in return? What do you receive Dr. Smith and you Dr. Brown?

First a central organization with a trained educator at its head. He must be paid from five to ten thousand dollars a year. He should have been the president of a university that is in close touch with the medical department and should know the desires and aims of the medical profession and he should also be conversant with the routes and methods of distribution of education to the people. You cannot employ this man for twenty or twenty-five thousand dollars a year if he does not know that it is best for a long period of time. He will not in the long run have any nerve value in something that may perish in a year or two. It must be for a long time or indefinitely if he sustains himself in the position.

Second in your home town you receive a report that your competitor is unethical that he is securing his business through improper inducements. The story may or may not be true but you report the matter to headquarters and an investigation will be instituted to determine the facts, and the condition will be corrected in consonance with the requirements. In addition to this, a lesson is already being disseminated which is elevating the moral tone of the profession in its relations to its fellows and to the people.

Third there will be a central bureau of information—in Washington if you like—to which you may apply for aid in the management of each one of your cases that is causing you anxiety for information as to the best line of literature on any individual topic and for information as to the best place to attend clinics for instruction.

These and many other things you will receive daily weekly monthly and annually for your investment of \$500 for your investment of \$5 which is 5 per cent interest on \$500. Could one expect greater returns from such a small investment? [Loud applause.]

Dr. FIVVER. Now gentlemen the cards have been distributed for your disposition. I trust you will fill them in as many of you who can and I feel sure that most of you perhaps all of you can if you will. Just note the conditions mentioned on the card. This is not to be paid at once. It is to be paid at your convenience. Call it an investment or a sacrifice if you will but remember for what it is used the sacrifice is made. Anything and everything that it is worth will require a certain amount of sacrifice.

REMARKS BY FELLOWS

DR. F. D. GRAY, Jersey City, N. J. I simply want to express my gratification at the clarification of one point which was made this afternoon by our

THE HIGHER EDUCATION IN SURGERY

FELLOWSHIP ADDRESS

By EDWARD H. BRADFORD, M.D., I.A.C.S., BOSTON

THE American College of Surgeons has shown such remarkable vigor in its development that there is every reason to believe that it will become a most important agency in the advancement of American Surgery. It may therefore be proper to call to your attention a few suggestions for the consideration of this organization relating to better education and training of our surgeons.

It has been said by those who undertake to study the American people that the typical American although energetic resourceful and venturesome lacks a knowledge of fundamentals. He has the defects as well as the virtues of the pioneer. Are these traits characteristic of the American surgeon? If they are the fact should be reckoned with in our plans for the training and education of our surgeons. We should foster the energy of the pioneer and give to him the fundamental knowledge needed by a master.

In the early days the aspirant in surgery became the student of the nearest active practitioner to whom he could attach himself. He was an article assistant. After a while he ventured upon practice alone and in the rough school of experience competition and emergency he developed force. Later groups of forceful men associated themselves together and formed proprietary schools and the country was filled with energetic aspirants in surgery.

There are advantages in this system of education in a large new and unsettled country — the training fits the locality. It does not however tend to develop thoroughness or scholarship.

The European method of educating surgeons was to collect students in the large cities where they were taught by learned men the fundamentals of knowledge in medicine and surgery. They learned anatomy and were stimulated by watching the great surgeons at work in their hospitals. Besides learning the essential principles they acquired high standards.

The product of the American system of educating surgeons has been excellent. There have been developed some remarkable men and as alert and resourceful a body of skilled surgeons as can be found in any country. But can we claim to have produced many of those who have done most to influence the surgical thought of the world? We developed Ephraim Mc Dowell but we have yet to produce a Lister.

In this connection it is interesting to reflect upon how much more America a professedly peaceful country has done to revolutionize the science and art of war than the humane art of surgery. The advance in open order field entrenchment for the attacking army the use of cavalry in long raids on the enemy's lines and as mounted infantry improved implements of war the rifle the automatic pistol the Hotchkiss gun and in

has been that you get out of marriage just what you put into it. So I want to say to you gentlemen we are going to get out of this movement just what we put into it and as in marriage our posterity will get out of it just what we put into it.

DR FRANK. Gentlemen the chair really does not feel like calling for any further remarks. There is just one thing that I wish to say. The last speaker referred to a number of classes of men but overlooked one class and that is the great big man in the profession who needs looking after too. (Applause and laughter.) He is not going to be forgotten.

DR (STERLING) RYERSON. Toronto. It was with a great deal of pleasure that I received the invitation to attend this great meeting of the surgeons of the United States. The capital of this great Republic as I came here very readily because of my interest in surgery and because of my feeling of sympathy and regard for the people of the United States. I felt it a great honor as a Canadian and as a British subject to be permitted to enter your College as one of your fellows. Let me remind you that there is another great College of Surgeons the College of Surgeons of England. And let me remind you of the beginning of that college. Two hundred and fifty years ago the College of Surgeons or the barber surgeons of England were a very insignificant and a very weak and powerless people. But there were among them wise men men of science men of ability who saw farther than their day in which they lived and who founded the great College of Surgeons of England. Other times make other practices. They began in one way you are beginning in another. They began in a very humble way rising from the depths into the leading college of surgeons of the world. You are rapidly born. You actually exist as a great profession but you are trying to be something better still and organize this College as a great power as a great element to assist the profession of surgery. So you are doing something that is not only going to redound to your credit but to the credit of the United States. And let me say with all sincerity that I believe the time will come when the center of medical education and medical science will be on the continent of America. I am not flattering you you know but I believe that to be the truth. Let me tell you a story—speaking of flattery—to illustrate what I mean. On one occasion Lord Baco's field was at Windsor Castle and he was asked by the Queen what he considered the two greatest books in the world. And he said Madam I consider the two greatest books in the world the Bible and your Diary of My Life in the Highland. He was asked by the courtiers afterwards why he said that and he replied When I flatter royalty I lay it on with a trowel. I am not laying it on with a trowel here. I want this to be a great institution and you have power by your great moral influence to build up a great college and you have also the great College of Surgeons of England as an example. But you are going to do something more. You are

going to do something more. You are going to do something with regard to reference libraries with regard to being able to consult the most useful works and libraries and that requires money and that is why you are called here to-day. I do not believe you could do better than you have planned because your benefactors will be great very great but the greatest of all benefits to be considered is an unselfish benefit to the patient. Every medical man whose faith is grounded upon the ethics of our great profession has but one view the great benefit to be secured for the patient. Whether his own personal interests are served or not that is his one object. And that is one reason for supporting this institution. You are going to do yourself and your patient an enormous benefit. I believe this College will have great success and that its members will grace it with their ability and with their loyal and conscientious support.

DR TRAPP. We do not want any one to be slighted. I hope that any one who has not received a credit will ask for one before he goes out. It is important in order to make the plan effective that a substantial part of the amount should be pledged at this time giving reasonable assurance that the entire amount will be subscribed within the year. It is therefore necessary that the gentlemen will add their names to these cards. Those who contemplate doing so and I trust you all will for the good of the cause do so to-day so that we will know where we stand. There is a lot to be done in the next year and it is a big amount of money to raise but we need it and we are going to get it. (Applause.)

Gentlemen before we adjourn there is one other thing I am going to ask you now to meet by states in order that you may nominate a list of men from whom the Board of Regents can select the Chairmen for the new Credential Committees. Remember that we are now standing not with unwilling feet, I trust where they brook and resist. Back of us is the old organization from front of us is the new plan the real work. Now we have new committees—new Credential Committees—and in order to make this as democratic as possible to free it from the charge of centralization or whatever else you choose to call it we want you to meet and give us a list of names from which we can select the Chairmen of the State Credential Committees. Now then very few have three votes. He can vote those three for one man if he want or he can vote them for three men. From that list of names we will select three from the three highest—not necessarily the highest but from the three highest—by the Board of Regents to be the Chairmen of the new committee.

DR FRANKLIN. I tapped for order and made the following announcement. I wish to make other announcement and that is that this \$500 may be paid in annual installments if preferred. That this \$500 is for 11 memberships and from it will be deducted the Fellowship dues of \$500 and all annual dues that may have been advanced at the time the first installment upon the subscription is paid.

in promoting the elevation of the noble art of surgery to a higher plane than it has ever attained before

Our medical schools to-day have thanks to the energy of our medical profession and the influence of the American Medical Association been brought to a standard state of efficiency and no medical student can be come a practitioner who has not received a proper knowledge of the fundamental sciences. When he reaches the stage of practice he should know how to use his knowledge on lines of trained reasoning or appreciate the arguments of those who do.

If the graduate desires to practice surgery he should be trained as a dresser and should after finishing his medical education have opportunities for technical training in surgery by service in hospitals that need properly qualified assistants in surgery and residents.

The hospital should do more than give positions to young men who help in the surgical work of the hospital; they should arrange for their careful training in surgery.

Endowed hospitals to day should not be content to care merely for the sick in their wards; they should aid in the combat with disease. There should be connected with every hospital not only nursing and operating facilities but also agencies for determining the ultimate results of operative procedures. The hospital should be a clinical laboratory for the acquisition of knowledge relating to the surgical care of those surgically afflicted. A proper valuation of surgical methods is essential and for this terminal results must be tabulated. This can only be done by efficient organization; it cannot be properly done by the desultory efforts of a few energetic surgeons.

Research and animal experimentation are aids but experiment being impossible in the human animal sound generalization is only possible when based upon a large number of carefully recorded cases collected in large hospitals and studied by a number of trained observers. This is the proper work of hospitals and they should be rated according to their efficiency in such work.

From hospital residency the young surgeon can develop further as a junior associate to a broad master in surgery who should encourage such association and should promote individual effort and independent thinking of the properly trained who seek to advance themselves to mastership by thorough preparation and carefully considered experience.

Much work by an association like this is needed to promote a proper knowledge in the community of the need of cooperation of hospitals in the work of the development and education of surgeons. It is not only in the arrangement for dressers and residents that this is needed but also in a suitable arrangement of the services of attending surgeons that it may be possible to utilize the experience gained for the benefit of the science of surgery. Short services interrupted services services so arranged that generalization in regard to method is difficult if not impossible are too frequently provided for in hospital organization. The surgeon spends his

naval warfare the ironclad lateral shell firing the torpedo the mine the submarine — all are products of American invention or first shown to be of value by American example The field telegraph the heliograph the telephone and the American invention the flying machine have revolutionized war During the same period surgery has been revolutionized but how much can we justly claim that America has contributed to the marvelous changes wrought in the last fifty years?

There is another criticism of our present surgery applicable to all modern surgery but perhaps more so to this country as it is especially emphasized in our surgery It is claimed that surgery to-day is overdone that as in the past there was polypharmacy to day there is polysurgery and that there is danger of needless heedless operating Are there just grounds for this accusation?

If we can imagine the great masters of surgery of the last century looking down upon a modern surgical amphitheatre can we not fancy that they would be filled with astonishment perhaps also with horror Horror in the thought of the many lives sacrificed in former times through the ignorance of the simple laws of asepsis but also horror perhaps at the number of operations done now where Nature if given a fair opportunity could cure and perhaps cure more satisfactorily

If the surgeon in the past more than his modern successor killed in his operations, he maimed less Afraid of a possible fatal result he operated only to save life — never to determine the nature of the disease exploratory operations were unknown To-day an operation is too often undertaken on a chance of benefit subsequent operations follow to relieve the scar tissue caused by the first operation which unsuccessful in furnishing relief was thought successful in that the patient did not die but lived with symptoms somewhat relieved by changed environment

Do not modern conditions favor the development of surgery of this type rather than the training of the surgeon who knows when not to operate? It is unquestionably the function of this organization to promote the development of surgeons who are not simply hands for such general practitioners as unable to make a diagnosis or direct further treatment turn for help to their more venturesome colleagues There should be surgeons of broad minds thoroughly familiar with methods of diagnosis and capable of forming a judicial opinion as to the relative value of both operative and non operative treatment

Surgery in its lower grades may be a specialty requiring chiefly the skill of trained hand but the master surgeon covers the whole field of the art of healing The corps commander to-day must be trained as an engineer but if he is only that he will never prove himself a great commander

Fortunately for our profession and for the community there exist influences which can check the narrowing and debasing influences which hinder the full development of the science of surgery among us School hospital research institutions surgical societies universities, and an organization such as this American College of Surgeons can aid powerfully

country of ours several foci where the art of surgery is practiced and taught in the highest degree of excellence. It is a great satisfaction to the observer to see already centers developed where the work is worthy of the careful consideration of the leading surgeons of the world. An increase in the number of these places where the science of surgery is investigated and the art of surgery efficiently practiced cannot fail to produce results which will in time claim leadership in surgical thought.

A few words only are needed in regard to the question of what may be termed surgical ethics, a subject which cannot be ignored by an association like the American College of Surgeons which is to maintain the standards of our profession.

If it is borne in mind the great opportunity which exists for the gross misuse of the power the surgeon holds it might seem extraordinary that so little of gross commercialism or base malpractice exists. The surgeon at the head of a small private hospital has power greater than that of a czar. Under an organization trained by himself with no one but his attendants to criticize his activities he wields a power controlled only by his conscience and his higher instincts. It may be said that in the process of his education and in contact with his fellowmen no one can rise to eminence in surgery without an education which elevates him from the baser temptations which are more potent in other callings. It certainly is true that in this commercial age medicine and surgery are less commercialized than any of the other large human activities. Machiavelli the great thinker of the period of the Renaissance held up the standard of the ideal prince whose craft and deceit were regarded as the proper functions of the ruler and statesman but we have no evidence that the surgeons of that time were other than truthful and honest.

To day the philosophy of the superman that might makes right will never find acceptance in our profession. As the soldier must have courage and the priest and clergyman purity the surgeon must be human.

It cannot however be ignored that the danger of lowering the standards among young and ambitious surgeons eager for the renown and emolument of a large practice is something which must be considered by an organization like the American College of Surgeons. There can be no compromise in this matter. Any one practicing the art and science of surgery who is unmindful of the high responsibilities and duties of his profession should receive immediately the condemnation of his fellows. The true surgeon should be like Caesar's wife above suspicion he must be above reproach.

It can be said that the occasion is ripe for the higher development of surgery in America. How long the present Balkanization of Europe is to continue and how much chaos is to result no one can tell but it is certain that the Mexicanization of North America will stop at the Rio Grande. If we have peace we have also the responsibilities which come with the blessings of peace and these are to be regarded as held by us in trust for the benefit of the human race.

energies centering his attention upon individual cases, presenting few surgical problems and is unable to devote his time to the larger problems of the treatment of disease in general. The younger surgeon may be perfectly competent to take care of the individual case but the surgeon of experience with various methods should be given an opportunity to direct the treatment and to determine the value of improved methods. In many cases this causes disarrangement of existing hospital services, but where the authorities are aware of the need of such changes they can be brought about to the benefit of surgical science.

The road to the leadership in surgery is a long one. If art is long surgery is longer. It may take but little time to teach a man to play the violin but for a virtuoso—a Kreisler—years are needed but how much more is required to develop a Mayo or a Kocher!

How much can our societies aid in the better education of surgeons?

The only real education is self education. This is helped by opportunity of comparison with others. The discussions of colleagues reveal individual strength and weakness.

Surgical societies should be organized so as to promote the careful study of surgical problems, the value of methods, a proper standardization of treatment and should discourage the exploitation of individual success. Little benefit could come from a meeting of Jack Horners though a discussion among them might furnish entertainment. Cooperative work among surgical societies would be of great value in the direction of study, the promotion of interest and in the elevation of standards.

A more difficult matter suggests itself in the question of the bestowal of proper degrees and titles. The public has become trained with more or less accuracy to distinguish between the incompetent and proficient in music. Would it not be well if there could be some accepted standards of recognition of the trained and judicious in surgery as compared with those whose qualities are chiefly energy and boldness, driving forward an untrained mind—who are in hot surgical adventures? Masterly skill in surgery is not a quality easily recognized by the public. The death rate was formerly a check to the injudicious surgeon to day thanks to anesthetics there should be no death rate and it is hard to follow the trail of failure among the convalescents who rejoice in a recovery from what has seemed to them the jaws of death nursing their impaired activities with satisfaction in the thought of what might have been and what they think they have escaped from.

Could it not be a function of the American College of Surgeons to aid in a movement to standardize surgeons? There are apprentices, journeymen, craftsmen, masters and past masters in the arts. Could we not help the community if we were to grade and rate surgeons as assistants in surgery, i. e. medical graduates, bachelors in surgery, masters in surgery, doctors in surgery? Should there not be a high degree of honor for great surgeons comparable to that awarded to statesmen or lawyers in the Doctor of Laws?

American surgery will be advanced if there are developed in the large

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THE TREATMENT OF OSTEOMYELITIS¹

OBSERVATIONS ON NINETY-SEVEN CONSECUTIVE CASES WITH THE END-RESULTS

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THIS report is based on the ninety seven consecutive cases of osteomyelitis treated by me at the Massachusetts General Hospital up to October 1, 1913. During the year ending October 1, 1913 I had the opportunity of operating upon or treating forty five cases embodying all types for a special assignment all cases of osteomyelitis entering the hospital were placed under my care. Before this I had had fifty two cases turned over to me through the courtesy of the visiting surgeons who knew I was interested in the subject. These cases represent all types of the disease from the acute case to the chronic one of long duration that had been maltreated from the first. It also includes fifteen cases of petic or tubercular osteomyelitis or cases caused by direct extension of sepsis from the soft parts as in septic hand or compound fracture. These I have called cases of secondary osteomyelitis. Some of these cases were referred to the departments to which they belonged while others were treated by me. Excluding these there are therefore eighty two cases of idiopathic infectious osteomyelitis.

I have attempted to better the results usually obtained in the treatment of osteomyelitis as the disease is seen in a large

general hospital by recognizing and treating the acute cases promptly while in the chronic cases I have tried to devise a method that will give some hope of a permanent cure in the various types. As a result of the work on this series I feel I can draw definite conclusions as to the prognosis of cases in a given class and also make suggestions which may be of value in the treatment of the more obstinate one.

TECHNIQUE

Instruments. No instruments other than those commonly used in bone surgery have been employed. For making trephine openings the Doyen burr has been used but if the bone is eburnated it is liable to break. In these cases a trephine or chisel is to be preferred. I have used a motor driven saw recently but it generates an enormous amount of heat. In resections I have used a Gigli saw and in the cases of bone graft the crest of the tibia was removed satisfactorily with a broad thin osteome.

When possible all operations have been done with a tourniquet as with it much more accurate work is possible. Care has been taken to do as little injury to the soft parts periotome and living bone as possible. The wholesale curetting out of normal marrow as is sometimes done is to be deplored.

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It is worthy of notice that at the present time when we are in the confusion and welter of war and in the upheaval of traditions when the foundations of our civilization seem to be shaken when new philosophies arise to confuse the question of right and wrong when the power of strength seems to overthrow the sense of the brotherhood of man when art is trampled upon and force enthroned when laws and treaties are disregarded that the one profession whose value is unquestioned is that of the surgeon. Never was there a time when our art commanded greater respect or deserved it more than at present. It is therefore unquestioned that the development of this noble branch of the great science of medicine is a work which deserves the earnest effort of all associations organized for the help of human kind.

It is not simply in the carrying trade or as bankers that we should aspire to leadership. Primacy in the noblest and most humane science and art comes to us now as a duty.

Modern surgery may be said to have begun in France over a hundred years ago through the leadership of a brilliant group of surgeons who were followed by an illustrious school of British surgeons. Then came the wonderful rise of German surgery to which we are all such debtors. Are we to remain followers, provincials, notable chiefly for our ability to adopt the example and teaching of others?

In the literature of our art there are names before which we all do reverence—Dupuytren, Larrey, Nelaton, Brodie, Paget, Lister, von Langenbeck, Billroth, Volkmann. They were thought compelling masters who shaped the surgical science of a century.

What names are to be written now upon the open book of the history of surgery? Is there not a page ready for the names of great Americans who will give to the noble art of surgery a luster never known before?

It is the proud function of the American College of Surgeons to aid in the advancement of the higher education in surgery. The American surgeon will never lack skill, energy, nor resourcefulness, to these must be added wisdom.

general infection or showed evidence of it in the multiple scars over the various bones. One of these had an acute infection from the flare up of an old process in the head of the humerus (Case 81). There was panophthalmitis and multiple abscesses in the soft parts all over the body but no other bones were infected.

COMPLICATIONS

The complications were so many and varied that only certain ones will be mentioned. The wounds healed as granulating septic wounds do and occasionally required secondary operations for pocketing. In the cases of general infection almost all possible complications occurred and it was manifestly impossible to foresee or guard against them. One chronic case was a bleeder and the hemorrhage was stopped with considerable difficulty. This man spoke little English but said later that the same thing happened after a previous operation. One case (11) an adult with chronic bone abscess of the head of the tibia had infection of the knee following operation necessitating later resection of the joint. This patient walked around the ward the afternoon of the day of operation which fact probably had some bearing on the subsequent infection of the joint. There have been several cases of erysipelas usually around the sinus developing several months after the patient has left the hospital. In one case it developed around the scar on the leg where there was no open wound. There were six of these cases two of them having erysipelas twice (Cases 12 49 53 67 68 82). Two other cases gave a history of erysipelas during the acute attack many years before (Cases 2 57).

ETIOLOGICAL DATA

The data in regard to age sex bones involved etc is similar to that given in other articles on the subject. In the table the cases in which more than one bone was involved are grouped according to the bone in which the process started. I think a much larger proportion of the cases is due to trauma than the table shows, as in many of the chronic cases the detail of the onset are very vague.

Age (at onset of disease)	Cases
0 to 1 years	1
1 to 3 years	7
3 to 5 years	9
5 to 10 years	17
10 to 15 years	23
15 to 20 years	14
20 to 30 years	6
30 to 40 years	3
Over 40 years	1
Sex	
Males	62
Females	20
Etiology	
Trauma	37
No trauma	28
Typhoid	1
Syphilis	3
Tuberculosis	6
Compound fracture	2
Direct extension sepsis	4
Metastatic from soft part sepsis	3
Erysipelas (?)	2
None given	12

Diagnosis with which patient was admitted to the hospital. Most of these were acute cases and the diagnoses are given to illustrate the common errors.

	Cases
Sprain	1
Abscess	12
Rheumatism	6
Meningitis	
Scurvy	
Typhoid	
BONES INVOLVED	
Humerus	
Upper end	8
Lower end	2
Shaft (local)	5
Ulna	15
Upper half	1
Lower half	2
Radius	
All shaft	
Upper end	7
Lower end	7
Shaft (local)	7
Tibia	2
All shaft	1
Upper end	10
Lower end	10
Shaft (local)	4
Fibula	34
All shaft	2
Upper end	
Os calcis	3
Metatarsal	2
Phalanx	1
Several bones involved	
Secondary	4
Diphtheria	15
Localized osteomyelitis	3
Total	69

as it is liable to spread the infection locally as well as to spread the general infection and destroy living bone. The wounds have usually been cleaned out with iodine or carbolic acid and alcohol, all septic tissues excised and when packed iodoform gauze used. This can be left in longer without becoming foul than plain gauze and there is less likelihood of spreading infection at the first dressing. When Moorhof's bone wax was used in abscess cavities the cavity was sterilized and dried with alcohol and ether. It is necessary to get it absolutely dry or the wax will not stick to the bone and as much care should be taken as a dentist uses to get the cavity in a tooth dry before introducing the filling. The wounds when the wax was used were closed without drainage.

In 1910 I reported cases of bone abscess treated in this manner and the cases are included in this series. From subsequent experience I see no reason to change the conclusions reached at that time—that the wax makes a good dressing but in my experience it is always eventually extruded as a foreign substance.

MORTALITY

There have been three deaths in this series: two in acute cases and one in a subacute case. In one acute case (77) three of the long bones were involved when the patient entered the hospital. He died the fifth day after operation of staphylococcus septicaemia, septic parotitis and multiple abscesses of the heart wall and all the organs (autopsy). The other acute case (18) died on the eighth day of meningitis and septicaemia (autopsy). Culture from the original focus showed staphylococcus from the blood, staphylococcus and influenza bacillus and from the cord, influenza bacillus only. The third case (76) was originally classed as acute periosteal osteomyelitis. She had a large abscess of the thigh evidently originating in the femur. She died at the end of nine weeks, of general sepsis. At autopsy there was tuberculosis of the lungs, spleen, adrenals and intestines and a psoas abscess. In the light of these findings and the fact that only one of the several cultures taken at operation showed a

growth I am inclined to think that the process was tubercular from the first and have placed the case in the secondary group.

GENERAL INFECTIONS

It is probable that in all cases the bacterium causing the disease is brought to the part in the blood stream, so all cases should be regarded as general infections. In this paper the term is restricted to cases showing the involvement of many bones in a similar process or where there were other foci of infection in the soft parts. Using this definition there were twenty cases: six acute and fourteen chronic or 24 per cent that showed evidence of a general infection. In three of these all chronic cases of less than a year's duration the focus of infection was in the soft parts and the bones were involved secondarily (Cases 80, 88, 93). The foci were respectively a septic thumb boils on the neck and a carbuncle of the nose. The latter case had four bones involved as well as suffering from pneumonia, empyema, and a psoas abscess.

Six acute cases had a general infection at entrance (Cases 15, 18, 68, 77, 85, 96). One of these had three bones affected when first seen and died on the fifth day of pyæmia (77) and one died on the eighth day of meningitis (18). The other four cases recovered, although desperately ill for a long time. One of these (Case 85) had eleven bones involved as well as pericarditis with effusion, pleurisy with effusion and ascites with an enormously enlarged liver. The chest was tapped four times and the abdomen twice. The boy can hardly be called well yet 15 months after the first operation as a new focus developed in a metatarsal three months ago. The length of time a general infection may persist occasionally manifesting its presence by new foci appearing in previously healthy bones is remarkable. In Case 93 an acute focus appeared in the lower end of the radius 14 months after the first operation for osteomyelitis in the humerus. The process was acute as shown by the appearance of the bone at operation and not a flare-up of an old focus that had been overlooked.

Fourteen chronic cases gave a history of a

general infection or showed evidence of it in the multiple scars over the various bones. One of these had an acute infection from the flare-up of an old process in the head of the humerus (Case 81). There was panophthalmitis and multiple abscesses in the soft parts all over the body but no other bones were infected.

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Scurvy	
Typhoid	

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Lower end	2
Shaft (local)	5
Ulna	— 5
Upper half	1
Radius	
All shaft	1
Upper end	7
Lower end	7
Shaft (local)	7
Tibia	— 2
All shaft	0
Upper end	0
Lower end	1
Shaft (local)	4
Fibula	— 34
All shaft	3
Upper end	— 3
Os calcis	
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Jaw	1
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Fourteen chronic cases gave a history of a

tively small The fulminating cases with toxæmia in which death occurs in one or two days are practically hopeless from the first but these are rare although possibly one of this series might be considered fulminating (Case 77)

In every case of sprain or rheumatism in children the possibility of osteomyelitis should be remembered Many of the mild cases have few local symptoms which might not be seen with a sprain There is little or no swelling but marked tenderness over the end of the bone involved If careful examination of the joint is made motion is usually painless which is important in ruling out rheumatism although the pain is usually referred to the joint In the younger children inability to use a limb and fretfulness may be the only symptoms These symptoms with a leucocytosis and some temperature make the diagnosis reasonably certain and operation should be advised The X ray is always negative But little harm is done if the diagnosis is wrong while on the other hand years of suffering may be saved by prompt treatment Case 68 is an illustrative case of this type of osteomyelitis

CASE 68 Male, 1 years old had always been well Three days ago he fell striking his left leg under him Since then he has had severe pain in the leg and has been feverish has not vomited, but is restless and cannot sleep Examination Well nourished boy thorax and abdomen normal throat, red pulse 130 temperature 104 leucocytosis 20,000, left tibia seems possibly slightly thickened It is very tender just above the ankle and quite tender over the tibial tubercle X ray negative Operation Tourniquet Incision on lower part of tibia Periosteum slightly thickened Two burr openings made and pus found in medulla Same thing done at opposite end of bone and while pus found the marrow was dark red Culture from lower end of tibia showed profuse growth of staphylococcus aureus from upper end slight growth Culture from throat showed streptococcus Course The temperature dropped and the pain was relieved shortly On the 14th day the temperature again went up and a focus was found the patella and patellar bone Culture showed staphylococcus The recovery was uneventful and the wounds healed in three months without the discharge of a sequestrum The patient was well one year later (Fig. 4)

I have found pus or obtained a positive culture from the medulla in every early case I have operated upon

The above applies to the early mild cases The symptoms in the severe cases are similar varying only in degree but may be over

shadowed by the toxæmia and evidence of general sepsis Thus there may be symptoms similar to meningitis typhoid or milary tuberculosis and in cases presenting these symptoms the long bones should be examined to rule out the possibility of osteomyelitis In the mildest infections the symptoms are as first stated only less marked and these have usually run five or six weeks before surgical aid is sought In these the X ray is of value in making the diagnosis

Periosteal The four cases I have placed in this group I infer are periosteal osteomyelitis or acute periostitis as there was an abscess in the soft parts directly over an area of bone bare of periosteum The medulla on opening was normal I think it impossible however to rule out a septic hematoma as the symptoms were those of an abscess in the soft parts following trauma LeConte makes a point of the fact that the process may start anywhere in the cortex or medulla and while this is undoubtedly true I consider for practical purposes in most cases the infection starts in the medulla or much more rarely under the periosteum

The treatment in all these acute cases has been the same—immediate operation with retraction of the periosteum and the making of multiple openings in the medulla beginning near the epiphysis with a burr or trephine until normal appearing marrow is reached Two or three openings are usually sufficient and the operation does not take more than fifteen or twenty minutes When a flat bone as the ilium is affected drainage is about all that can be done Many cases seen early will heal without further trouble but if necrosis does occur subperiosteal resection should be done in from six to ten weeks depending on the bone If the cases are operated upon before bone destruction actually occurs and the pus is thus given a vent the greater number will heal in a comparatively short time without the formation of a sequestrum In many of the cases classed as acute without bone destruction I believe necrosis would have taken place if the operation had not been done at the time it was Of the eight cases recognized and treated

CLASSIFICATION

I have adopted the following classification as a matter of convenience. It is not made on any pathological basis but is of value in determining the treatment to be instituted in a given case. The classification may at first seem complicated but men who have had much experience with osteomyelitis will I think at once recognize the various groups. Certain cases fall naturally into groups but a few do not and these have been arbitrarily assigned to the groups where I think they belong.

	Cases	Total
Acute		24
Central		
Diffuse		
Fulminating	0	
Ordinary acute	4	
Local		
With bone destruction	4	
Mild type (bone abscess)		
Periosteal	4	
Epiphysitis		
Secondary (tuberculous, syphilis, et c.)	0	
Chronic		56
Central		
Diffuse		
6 to 10 weeks duration		
3 to months duration		
At 1 year duration	5	
Local (with bone destruction)		
6 to weeks duration		
3 to months duration	9	
At 1 year duration		
Local (bone abscess type)		
At one year duration	5	
After one year	7	
Resting cases		
Periosteal	3	
Epiphysitis		
Secondary		5
		95

The acute cases naturally group themselves into the central and periosteal types. The central is the common form and has been further divided into diffuse and local depending on whether the entire shaft of a bone is diseased or only a portion of it. The local type has been again subdivided into two classes: those cases with bone destruction and the formation of a sequestrum and those without bone destruction—the mild bone abscess cases seen in children. In many cases where bone destruction would undoubtedly occur it may be prevented by an early operation. The periosteal form is rare and relatively unimportant.

I have considered cases of roughly more than two weeks duration as chronic. These chronic cases have been classified in the same manner as the acute, diffuse always with bone destruction, local with bone destruction and local without bone destruction (bone abscess). All the chronic cases have been again divided in relation to the duration of the disease as the prognosis and treatment is different in the early cases than is used in those of many years duration.

Epiphysitis is what the name implies: osteomyelitis occurring in the epiphysis. Resting bone abscess is a term that has been applied by Thompson to the bone abscess in its quiescent stage when it is not causing symptoms. At this time it is usually filled with clear fluid.

I think it is the common impression and the one usually given in textbooks that osteomyelitis is a disease that destroys all or most of the shaft of a long bone and is always severe and accompanied by marked constitutional disturbance. In reality the reverse is true. The average case of osteomyelitis is comparatively mild but the difference is, I believe, only one of degree depending on the site, the severity of the infection and the resistance of the individual. I believe a very mild infection may occur which in children might be called rheumatism or growing pains which may subside and the infectious material be entirely absorbed, never causing further trouble or requiring operation. In this series in but thirteen cases was the entire shaft of a long bone involved while there were thirty-seven cases without bone destruction. These were the acute cases operated upon early and the cases of chronic bone abscess and represent about 45 per cent of the total number.

ACUTE CASES

The acute cases comprise by far the most important group as the prognosis of the disease in a great measure depends on its early recognition and its prompt energetic treatment. Some of the cases where there is extreme prostration and severe general infection are very difficult to treat at any time but the numbers of these are compara-

were necessary. It is now twenty months since the operation. There is no shortening of the leg (Figs 5 6 7 8 20). In Case 50 the entire shaft of the tibia was removed six weeks after the acute attack at which time the shaft lay perfectly loose in the periosteal sheath. Regeneration was poor and ten months later it was necessary to do a bone graft. The graft took and the boy was walking on the leg four months later. There is three-fourths inch shortening. Why regeneration did not occur I do not know, as it seemed an ideal case (Figs 9 10 11).

Thus of five cases in which subperiosteal resection was done at the time of election regeneration took place satisfactorily in four while in one case a subsequent bone graft was necessary. The sixth case was done five days after the onset of the disease and did not regenerate. This may have been due in part to the severity of the general infection. One thing is striking in the X rays of these cases. In those that were successful bone formed at the same time along the entire length of the periosteal tube (see Fig 7) while in the unsuccessful cases this did not occur but the bone grew in from the epiphyseal ends (Fig 9). I am not prepared to state whether bone is formed from the periosteum or whether it acts only as a limiting membrane. After subperiosteal resection the periosteum appeared to play no part in the two that were unsuccessful but the bone grew in from what was left at the epiphyses until it nearly met in the center. I have also no opinion as to whether a graft lives or is merely osteoconductive. From the X rays of Case 50 I should say that the new bone was formed around the graft probably from the bone-cells in it but the graft itself did not grow as the X ray taken four months after operation shows the graft in its original size and shape through the new thick tibia.

Bone grafts. In the two cases in which regeneration was imperfect after subperiosteal resection I performed a bone graft using the crest of the opposite tibia to fill in the defect. The graft in each case was about five inches long and the size of a large lead pencil. These were removed with ease with a broad thin osteotome. The attempt was first

made to cut them with a motor driven saw but I resorted to the simpler method as the saw generated so much heat I feared the life of the graft would be endangered. In one case (Case 50) the graft was taken without the periosteum while in the other (Case 85) the periosteum was left attached to the graft. The grafts were placed in a trough in the soft parts previously prepared thus bridging the defect and were fastened to the ends of the bone with catgut in a rough mortise-and-tenon joint. In both cases a small sinus formed but did not interfere with the life of the graft. In Case 50 regeneration was rapid (Figs 9 10 11) while in Case 85 it has been slow but at the present time the leg is stiff and the graft is slowly increasing in size (Figs 17 18).

CHRONIC WITH BONE DESTRUCTION THREE TO TWELVE MONTHS DURATION

Local and diffuse. The time limit set on these cases is purely arbitrary and depends on the bone involved and many other conditions. I have placed in this class cases in which too much involucrum has formed to permit of performing resection but in which the sequestrum is loose. Simple removal of the sequestrum with packing of the cavity usually leads to a permanent cure (Fig 15).

CHRONIC WITHOUT BONE DESTRUCTION LESS THAN ONE YEAR'S DURATION

Bone abscess. This may be said to be the subacute stage of acute localized osteomyelitis of the mildest type. The abscess has usually broken when first seen and a sinus is present. The diagnosis is made on the history and X ray which shows a definite abscess cavity in the bone. Certain of these cases cause symptoms of greater or less severity for months before the abscess breaks or the diagnosis is made. It makes little difference what operation is done all heal satisfactorily. Bone-wax may be used to make the dressings easier or the cavity may be packed with gauze. The following case is a typical example of this class.

CASE 81. Female 5 years. Tonsils and adenoids removed when three years old. Convulsion three or four

within a few days of the onset of symptoms in only one (Case 58) did a sequestrum form. In certain of these pus was found in the soft parts and under the periosteum as well as in the medulla while in others no pus was found but the medulla was of a dark color. These latter cases gave a positive culture and the symptoms subsided after operation. I have done immediate subperiosteal resection in but one case and can draw no conclusions. This case was of six days duration and the entire shaft of the tibia was destroyed. If practical it would be an ideal operation where the half of a long bone is destroyed early.

CHRONIC WITH BONE DESTRUCTION LESS THAN THREE MONTHS DURATION

Diffuse and local. These are the cases suitable for the operation of subperiosteal resection. The acute process has quieted down and the limb is swollen and presents multiple sinuses. The X-ray at this time shows a general worm eaten appearance of the bone with a haziness under the periosteum representing the new formed bone (Fig. 5). The operation has been done as described by Nichols and is really an early complete sequestrotomy. Care should be taken to remove all the shaft or diseased bone to obviate the possibility of secondary operations for pieces left and in fact secondary operations for one thing or another in my experience are the rule. The operation is usually simple and easy where there are two bones as in the lower leg or forearm but it entails considerable shock. The incision carried the entire length of the bone the periosteum and new formed involucrum attached to it stripped back and the old shaft pulled out or divided through normal bone. I found it easier in one case to divide the bone in the center and remove it in two pieces.

There have been in this series six cases of subperiosteal resection. Two have not been included in any of the tables, as I did not know where to place them. In one (Case 33) the shaft of the tibia had been removed seven months before by Dr. Hugh Williams but about one and one-half inches of dead

bone had been left at the upper and lower extremity. These sequestra were removed and the wounds healed in a few months. The boy is perfectly well and under his twenty months later (Fig. 19). In the second (Case 51) the resident surgeon had done the operation six months before but had removed only the center third of the tibia. I removed several sequestra and much involucrum from both ends of the bone. The wounds healed in about six months and the boy was well and has been up in his leg one year later. These two cases illustrate the necessity of removing the entire shaft of a bone in the epiphyses if it is all diseased, not being deterred by the near approach to the joint. In one (Case 83) the operation was done five days after the onset of the disease and the entire shaft of the tibia removed. While I think the operation saved the boy's life regeneration was poor and it was necessary to do a bone-graft operation eleven months later after the wound was entirely healed. This has taken but the growth of the bone has been very slow. However it is now solid at one end—three months after the operation. The other three cases were operated upon at the time of election that is eight to twelve weeks after the onset of the disease or after the dead bone had separated and before the involucrum had become too thick. One (Case 58) was an acute case which progressed after the first operation of trephining and drainage to bone destruction. The upper half of the tibia was resected and the bone reformed with great rapidity the child being able to walk on the leg in eight weeks. Unfortunately two months later while playing he fell down a flight of stairs and broke his leg. Following this although the fracture healed promptly a sequestrum formed and it was five months before I could induce the family to bring him into the hospital for its removal. When last heard from he was well but still had a small granulating area over the head of the tibia (Figs. 1, 2, 3, 4). In Case 53 the entire shaft of the tibia was removed nine weeks after the onset of the disease the bone regenerated well and the boy was using his leg in eight months. Two small secondary operations

TABLE OF CASES WITH RESULTS AT THE END OF ONE OR MORE YEARS

	Total Number of Cases	Not Traced	Died	Cases	Fal- lures	Under Treat- ment	Secondary Operations Necessary	Remarks
Acute diffuse	4						3	Case should be called success as still
Acute local with bone destruction	4			3			3	
Subacute local without bone destruction								Three others now under treatment
Acute periosteal								
Chronic bone destruction Up to 3 months								
Up to 3 years							3	
After 3 years				5	3		3	One case pulsed - operation One case not operated upon One case of amputation
Chronic bone abscess Up to 3 years	5			5				
After 3 years	7	3		6	6		3	Three operations on one case Classed as failure - however well
Resting cavity								
Chronic periosteal	3							
Chronic epiphyseal								
Secondary (tuberculous syphilis, etc.)	5							
Total cases (excluding secondary)	80			5			8	

or trough. About half the thickness of the bone was removed in this manner. The denuded bone or cavity was then covered by a flap of living tissue either a flap of skin preferably or one of fat and fibrous tissue. This method seems to me to give the best chance for cure but is not by any means applicable to all cases (Fig. 16). I do not think that opening the abscess and packing the cavity ever leads to permanent cure but when bones such as the femur are involved it is often all that can be done. If the patient is intelligent understands the condition and will consult a surgeon when the pain begins it is not a bad palliative operation and the wounds often heal promptly and relief may be experienced for several years.

Case 50. M. L. 3 years. Osteomyelitis of femur. Abscess opened one year later. One year later piece of bone came out. Three years later broke open but he led a normal life. Another abscess formed five years later. Three years ago no more pain. He had attacks of hematuria. The hip joint quieted down after a few months. At present the hip is better than for three months and he can hardly walk. Examination shows a hard left trochanter some ten centimeters. X-ray shows much thickening

of the end of the femur. A distal abscess cavity situated near the neck. Operation. Cavities opened after cutting through one and one half inches of burned bone. Sides of cavity cut away much as possible. Skin flap made and sutured to cavity but this was not very satisfactory as cavity was too deep. Culture sterile. Wound healed in six weeks. Seven months later pain recurred and superficial abscess was produced. This did not necessitate giving up his work and he led a normal life. A second abscess formed three months later which he healed promptly after opening. He has now gone without symptoms fourteen months. I do not consider this case a cure but I know of no way of effecting it. The patient is intelligent and he consults a surgeon as soon as the pain begins. I think he will get long and enjoy little trouble.

Bone abscess more than one year duration (Brodie's abscess). These cases represent the chronic form of the mild local infection. The history is usually typical. The early history is that of an acute abscess which usually breaks and the sinus after discharging for a time heals. After this at intervals of six months to twenty years the pain in the joint recurs and either subsides or another abscess breaks with the relief of symptoms. This may happen many times during a patient's life the exacerbations usually being brought on by trauma. Some of the milder types of abscess never break the pain lasting

times yr preceded by pain in the lower abdomen. For 1 month left ankle has been swollen a pain in the left calf and some tenderness pain in the left calf but worse at night, no history of trauma. The lower end of the left tibia somewhat thickened the right tibia slightly tender pressure motion of the knee perfect no other symptoms negative. Key how a definite abscess at the lower end of the tibia and a question of a rather small one the physician at the time in the hospital. I am not sure of the lower end of the tibia. Cortex removed and cavity contained thick yellow pus opened. Cleaned with carbolic acid alcohol and ether and filled with bone wax. I pharynx and red blood cells found. Wound closed in 14 days no drain left. The wound healed at first but one week later a sinus formed which discharged wax. Wound healed four months later. At one year after operation X-ray culture of phyllocooccus aureus.

The cases in the foregoing groups that is the acute cases and the chronic cases of less than one year's duration if properly treated and followed up should with few exceptions be cured. These represent 55 per cent of the series or forty four cases. There will always be some failures. The exception are the severe cases with the involvement of many bones and the cases in which the process starts in such bones as the pelvis or spine. If one operation does not cure a second should be done before it is too late as after a year the bone apparently loses its power to proliferate and close the cavity or defect made by the disease. Cases requiring two or more operations, if done within a year and finally cured should not in this disease be regarded as failures.

CHRONIC WITH BONE DESTRUCTION SEVERAL YEARS DURATION

Diffuse and local These are the most difficult cases and are often hopeless. They are generally adults who had the disease in childhood the diagnosis being overlooked or the case badly treated. Whether in future years as the disease is recognized and better understood there will be fewer of these cases remains to be seen but probably not in this locality so long as the immigration of the lower classes of Europeans continues. A few cases were probably hopeless from the beginning.

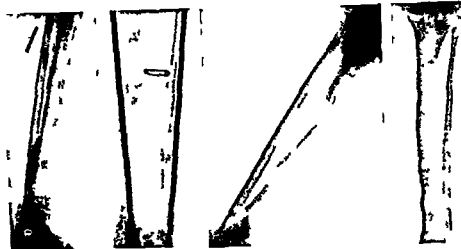
These cases are usually adults and give a history of an acute attack when a child which incapacitated them for six months to three years. Following that abscesses have

broken out at intervals of from six months to five or ten years with or without the discharge of a piece of bone. The history of one of these cases is typical of the rest.

C. E. 45 M 42 yrs Spinal ankylosis in 1894 low back pain had a bone abscess laying him up for five months. An operation was performed in 1904 at the hospital for another abscess. In 1907 he was in the City Hospital for some time and a tenative operation was done. He was in the hospital two years but entered the hospital again in 1909 for the same thing. He was in bed three weeks. In 1909 another abscess formed following trauma. He was in the hospital two weeks. After that he was in the hospital three times then at his leg and another abscess formed. He was in the hospital this time two weeks. Abscesses formed again in 1910 and 1911. He required operation. He was in the hospital about a week at a time. In the summer of 1912 he was in the City Hospital twice for abscess and in December he returned to the hospital and remained until the end of the year. He was in the hospital several times and the leg was finally amputated. If it had been properly treated at first it might have been obviated.

The bone although living in most of these cases has a very low vitality and becomes necrotic with the slightest trauma. In the X-ray the bone is much thickened and shows numerous cavities throughout its entire length while the skin is thin and shiny ulcerating at the slightest trauma. These are almost hopeless cases to treat and I know of no method to cure them except subperiosteal resection with tranplantation of the fibula or crest of the other tibia. The few cases I have suggested this to have all way refused when told of the length of time it will incapacitate them and the possibility of failure. In many although the entire shaft of a long bone has been destroyed, the sequestrum of at least one half has been thrown off early through the efforts of nature and this portion of the bone is comparatively normal. Even if this has not occurred usually only one portion of the bone is badly diseased and with the exception of the cases in which the leg was amputated that was the condition found. At any time some quiescent focus in another part of the same bone may light up however but this can be treated later.

In some of these cases where there were multiple abscess cavities surrounded by eburnated bone the cavities were opened and cleaned and the sides cut away leaving a comparatively flat surface instead of a hole



Case 53 Figs (from left to right) 5 6 7 8 Sub periosteal resection of tibia

Fig 5 Before operation, eight weeks after onset of acute attack. Entire shaft destroyed and in X-ray the bone has worm eaten appearance. New bone seen beneath periosteum.

Fig 6 Two weeks after subperiosteal resection. The posterior wire is in place and the fibula alone can be seen.

Fig 7 Eight weeks after operation. The well formed bone is seen in the periosteal tube and growth from the epiphyses.

Fig 8 Ten months after periosteal resection. The bone has reformed but is somewhat small and does not appear normal. It is strong and functionally at this time the result is perfect. (See also Fig 20.)

than one year from the time of discharge from the hospital. I hesitate to do this as, knowing the course of these abscesses I do not think they should be called true cures until an X-ray has been taken which shows the cavity obliterated (see Case 28).

Chronic periosteal. In these cases there is usually a sinus leading to a small piece of necrotic bone on the outer side of the cortex. Excision of the sinus and scar tissue with removal of the necrotic bone and sterilization of the cavity with iodine or carbolic acid usually effects a cure. In some cases the wound may be closed without drainage.

Epiphysitis. My experience is too limited to draw any conclusions. I should say however that the area is so small that curetting and packing is sufficient to effect a cure.

DETAILED ANALYSIS OF CASES AND RESULTS

Acute diffuse. No case of more than a week's duration has been included. There were four cases in this group (Cases 15 77 85 96). All had a general infection with the involvement of many bones and the problem was more to save life than to cure the local condition. Two of these were cases of osteomyelitis of the ilium. One has had

several sequestra removed since as well as having had an operation on the humerus for bone abscess all done in another city. At present four years later he has a small sinus which opens at times and he walks with a slight limp but is very lucky to be alive. In the other case eight weeks after the operation I removed a large part of the ilium subperiosteally. The bone has regenerated but the hip joint is involved and two other operations have been necessary. The outlook for cure is poor. The fibula was also affected.

The other two cases originated in the tibia. One of seven days duration had three bones involved at entrance and died on the fifth day of septicæmia (Case 77). The other case of six days duration (Case 85) also had three bones involved at entrance. In this case I did as LeConte has suggested—removed the whole shaft of the tibia at once. I think this undoubtedly saved the boy's life but regeneration was slow and bone was grafted later. This has taken but has grown slowly. The mother frankly says she wishes the boy had died and will not cooperate. Culture from all four cases showed staphylococcus.



C 40 58 1 g s (from left to right) 2 3 4 S bpenos teal resection upper third of tibia

Fig 3 show condition about 10 weeks after onset of acute attack and after the first operation of trephining. The trephine opening is resected. There is no bone destruction but the plate shows the dead periosteum.

Fig 2 The upper third of the tibia became necrotic and it was necessary to do a subperiosteal resection. The plate is taken out three weeks after the operation.



d t el from the onset of the disease. Bone is already formed by the periosteal tube.

Fig 3 About seven weeks after operation the bone has formed by the defect and the leg is stiff but not strong enough to bear weight.

Fig 4 About four months after operation the bone has reformed and is normal in size and shape. There is undue thickening of the cortex as yet and a defect can be seen at the center.

for a time then subsiding. Thompson gives a very good description of these abscesses. Most of my cases were reported in the *Boston Medical and Surgical Journal* May 1913 in an article on Localized Osteomyelitis of the Long Bone. The X-ray is typical. There is thickening of the cortical bone which may be so great as to mask the abscess cavity in the center. In most cases the cavity shows clearly. The abscesses vary in size, some of them being as large as three inches in diameter (Figs 12 13).

C 2 Male 33 years. Twenty years ago kicked by horse just below the right knee. The place became red and painful and 10 months later an abscess broke which discharged for 10 months and the healed. Four years later it broke again but healed in a few months. It is the perfect illustration for fifteen years or till 3 years ago when the abscess broke again. It was healed but recurred two months ago. Examination showed a red tender area three inches in diameter over the head of the left tibia. The bone is thickened. X-ray shows periosteal reaction and dead tissue. Operation. Cut opened, cleaned, filled with bone wax and closed without drainage. Culture of pus locusts. The wound remained clean but wax began to ooze from between the tibiae about a week. The wound continued to discharge for four months. A year later the cellulitis showed the fully obliterated.

I believe the best treatment when possible is to transform the cavity into a flat or lightly

curved surface even if half the thickness of the bone has to be removed and to cover the surface with a flap of living tissue either a pedunculated skin flap or a flap of muscle. Bone wax may be used but in my experience it has always been extruded as a foreign body. Others have from their reports had perfect success with it but although I think I have used moderate care I cannot repeat the work. Opening and packing these cavities is apparently useless, for although it is a perfectly satisfactory operation in the cases of less than one year's duration in these later ones the bone has not the power to grow in and fill the defect. The wound may heal but I believe an X-ray would show the abscess before and that the patient will eventually have more trouble. Sterilizing the cavity allowing it to fill with blood clot and closing the wound without drainage may give a very satisfactory immediate result but I doubt if new bone fills the cavity although it has been shown that fibrin stimulates the growth of bone.

I have called cases in this group cures that have gone without symptoms for more



Fig 13 (left) Case 57 male 9 years old Acute attack when 1 year old. Acute recurrence of an old bone abscess which had been quiescent 5 years completely healed some periosteal cortex not much thickened.

Fig 13 Case 50 Bone abscess at upper end of humerus (mainly) radiation There is so much cortical thickening due to the inflammatory process the cavity can hardly be seen. At operation the abscess contained at least two ounces of thick yellow pus.

Fig 14 Case 68 Acute osteomyelitis of tibia and tibia. The X-ray was taken ten days after the operation

of trephining the tibia and thirteen days from the onset of the disease. No bone changes can be seen in the tibia although the medullary cavity contained pus. The upper part of the patella shows slight erosion. The leg took place without bone destruction.

Fig 5 Case 75 Osteomyelitis of tibia five months after the onset of the disease. X-ray shows the sequestered upper half of the bone surrounded by a large amount of involucrum. It is impossible to perform subperiosteal resection in these cases. Removal of the sequestrum resulted in a cure.

to have another operation at the end of six months but only submitted to it one year later and is still under treatment.

Acute periosteal I have placed four cases in this class (Cases 47 69 86 and 95). In three of these following trauma and in the fourth following la grippe pain developed which was referred to a joint and was followed by an abscess. At operation an abscess was found in the soft parts close to the bone which was bare of periosteum. In three cases the medulla was trephined but appeared normal. These cases might be septic hematoma but as no blood clot was seen and as the bone was bare of periosteum I believe they originated in the bone or periosteum. Culture showed streptococcus in three cases and staphylococcus in one. The site was the lower end of the femur in three and the center of the humerus in one case. But two of the cases have been traced and both of these are well.

Chronic cases with bone destruction less than three months There are only two cases in this group in both of which the entire

shaft of the tibia was destroyed (Cases 50 and 53). The operation of subperiosteal resection was performed. One regenerated well and the boy was walking on the leg in ten months. The other regenerated poorly and it was necessary to do a bone graft from the shaft of the other tibia ten months after the resection. The graft was successful and the child was walking four months later. There was about one-half inch shortening.

Chronic with bone destruction three to twelve months Fourteen cases diffuse five (Cases 12 26 29 39 and 88) local nine (Cases 34 35 36 42 75 80 87 93 and 97). In these cases the sequestrum had formed and the involucrum about it was thick in many cases three fourths inch. They were treated by removal of the sequestrum and some of the involucrum with packing of the cavity. In some of the diffuse cases as in Case 12 with destruction of the entire shaft of the femur all the sequestrum could not be removed at once the child being in too poor condition to stand the operation and several

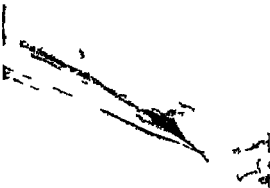


Fig. 6 Case 60 Osteomyelitis of the lower third of the tibia of many years duration. One year after operation the abscess-cavities were opened about the thirds of the thickness of the bone removed and flap of skin covering the defect. No trouble since. The picture shows the amount of bone removed.

operations were necessary. The end result is known in twelve of the fourteen cases. They have all been well for over a year.

Chronic with bone destruction after many years. Diffuse ten (Cases 1, 22, 45, 46, 55, 60, 62, 72, 73, and 79), local two (Cases 49 and 59). They were all middle aged or elderly people and were of many years duration. Average age 40.5 years. Average duration 28.5 years. Eleven were males and one a female.

One case demanded amputation (Case 79). One case had erysipelas when first seen. He was also a cardiorenal and was such a poor surgical risk no operation was advised. When seen one year later he was comfortable and had been working steadily but had a small discharging sinus. In a third case (Case 72) an old decrepit man the operation was simply palliative. He was well fourteen months later. The end result is known in eight of the remaining nine and five may be classed as cure, three as failures. In five cases the abscess was opened, the diseased portion of the bone removed with enough sound bone to transform the trouble thus made in a flat area (Cases 46, 55, 59, 60, and 73). A flap of living tissue either fat and fibrous tissue or skin was then swung across the bone surface. Three of these are well

over one year from the date of operation (Cases 55, 60, and 73). One (Case 59) has had two abscesses operated upon since and the process evidently is not cured. In the fifth (Case 46) the upper end of the tibia the site of operation is well but he has lately had an abscess of the lower end on which a similar operation has been done. He is not classed as a cure. In one case bone wax was used (Case 22) the man reporting at the end of a year that he was well. In Case 1 the abscess was opened and packed. He has not been traced. In Case 45 a palliative operation was performed but the patient returned eight months later with the condition as bad as before and demanded amputation.

Localized without bone destruction (bone abscess). Less than one year's duration. There were five cases (Cases 4, 16, 24, 32, and 81). These represent the cases of low grade infection that have been overlooked. Four followed trauma and were sent to the hospital for sprains or rheumatism and the fifth was diagnosed as a boil. Culture staphylococcus in three, no growth in two. Bone wax was used in four cases while the fifth was packed with gauze. In no case in which the wax was used did it stay in the cavity but a sinus formed and it was slowly extruded. All five cases are well over one year after operation and X rays have been obtained of a few of them. The wound healed slowly, the sinuses closing in from four to six months.

Bone abscess several years duration. There were seventeen cases (Cases 2, 3, 6, 7, 11, 14, 17, 21, 25, 28, 30, 57, 71, 74, 84, 90, and 92). Of these twelve have been traced and the end result is known. Six are well (Cases 2, 5, 7, 25, 57, and 90). In three bone wax was used, two were packed and in one the cavity was obliterated by turning in a flap of muscle. The six failures were as follows. In one bone wax was used (Case 17) but at the end of a year a sinus persisted and the cavity was as large as ever (X ray). Another operation was suggested but refused. In Case 28 the cavity was sterilized and allowed to fill with blood clot. Healing was by first intention but eleven months later the symptom returned and an X ray

showed the cavity as before. Two more operations have since been performed on this case and the patient is now well fourteen months after the last operation. The wound has been healed ten months. In Case 11 infection of the knee joint followed the operation necessitating resection. One year later he was well of his osteomyelitis but had a stiff knee. In Case 6 a bleeder the cavity was packed. Three years later the sinus persisted and an X-ray showed the cavity as before the operation. In Case 30 a sinus persisted one year after operation. No X-ray was taken and there is no further report. In Case 92 the patient had a very large abscess of the head of the tibia. The cavity was obliterated by a pedunculated skin flap. A sinus persists but he is still under treatment and it will probably heal.

Bone abscess (resting cases) There were two cases in this group. Both were in the center of the tibia of long duration and while they had caused symptoms had never broken as an abscess (Cases 13 and 38). The cavities which were filled with clear fluid were opened, sterilized, allowed to fill with blood clot and the wound closed without drainage. Healing was practically by first intention. Both patients were well over one year from the date of operation. The Wassermann in one case was negative and in the other it was not done.

Chronic periosteal There have been only three cases in this group (Cases 19, 37 and 78). All were of the upper end of the femur. Case 19 followed typhoid fifteen years before and had been operated upon eight times before. Considerable dead bone was removed at operation but further operation was considered probable. One year later two pieces of dead bone were discharged after which the sinus healed and the patient has been well for three years. Case 37 had a flaking off of the cortex of the outer surface of the trochanter. The sequestrum was removed. He was well a year and one-half after operation. Case 78 writes that he still has a sinus and should submit to further examination and treatment.

Chronic epiphysitis One case of five months duration (Case 23). This was of the epiphysis



Case 85. Figs. 7 and 8. Bone graft of tibia. Subperiosteal resection of the tibia was performed 1 day after the onset of the acute attack, at which time the shaft was entirely stripped of periosteum. Regeneration did not take place but considerable bone has grown in from the epiphyses. There is a separation of the epiphysis of the fibula with dislocation upwards. Eleven bones were removed and the patient suffered well from ascites, pleurisy and pericarditis.

Fig. 7 (at left) Condition of tibia one year after operation of subperiosteal resection.

Fig. 8. Eight weeks after the bone graft from the crest of the other tibia was inserted. There is some new formation of bone about the graft. Clinically the bone is living; the graft has increased size and union is apparently solid at one end.

sis of the os calcis. The necrotic area was curetted and the wound packed. The sinus closed in three months and the boy was well two years later.

Secondary cases The etiology in these was as follows:

Tuberculosis (Cases 3, 56, 65, 76, 83, 89 and 94)	7
Compound fracture (Cases 3 and 8)	
Extension of sepsis (Cases 9, 27, 43 and 64)	4
Syphilis (Cases 54 and 66)	

SUMMARY

It is very difficult to draw conclusions from this series of cases definite enough to publish although in my own mind the subject is fairly clear. I shall therefore give my impressions based on these cases and borne out by facts as far as possible. It is also manifestly unfair to compare the results of the treatment of osteomyelitis in a children's hospital where all the cases are

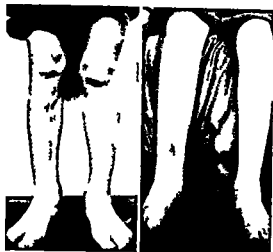


Fig. 9 (left) Case 53. Result 1 year after operation. Subperiosteal resection. There is no shortening and the function is perfect.

Fig. 20. Case 53. Photograph of leg ten months after subperiosteal resection. (See Figs 5, 6, 7, 8.)

acute or of short duration with those in a general hospital where many of the cases are of twenty or thirty years' duration.

Certain of my cases I regard as cures while others I have little hope for although they have remained well for over a year after operation. In general I believe a case of osteomyelitis seen and properly treated in side of a year from the onset of the disease should be cured. There are many exceptions to this statement and the prognosis varies as to the bone involved and the severity of the general infection. I consider Case 15 (acute diffuse osteomyelitis of the entire ilium with general infection) a successful case although at the present time four years after operation he still has a sinus and walks with a slight limp. He is not however classed as a cure. It is also much easier to treat a diffuse case involving the entire tibia than one involving the femur as in the former resection can be done and the bone is much more accessible. I tried once (Case 12) to do a subperiosteal resection of the shaft of the femur but had to give it up as the child was in poor condition and nearly died on the table from loss of blood and shock. This child had intelligent parents and was

followed up. She is now perfectly well and has been for two years but it was necessary to operate on her five times over a period of one and one half years.

I do not consider a case of this disease a failure if the first operation does not cure as I would in other conditions but I think that at the first operation a prognosis as to further operations can be given with some degree of accuracy. The point is to do these secondary operations at the proper time with a definite object in view and I cannot emphasize too strongly the importance of following the cases up during the first year.

In seventy-two of the eighty-two cases the age at onset was under 20 and in fifty-eight or 70.8 per cent under 15. To give up one or two years of a child's life to bring about a recovery from a serious disease is nothing if we know that he will be cured and will not have to spend a month every other year or two of his adult life in a hospital or at least be incapacitated and unable to work and support his family. I have cited one or two typical histories of these overlooked and improperly treated cases previously.

To sum up if the diagnosis is made at the onset of the disease and the bone operated upon at once the prognosis is good except in the most severe cases of staphylococcal septicæmia. This septicæmia can evidently exist in what may be termed a latent state for a long time.

CONCLUSIONS

1. In children with pain in a limb and evidence of toxæmia always consider osteomyelitis.

2. Operate early even if the symptoms are rather vague. If the diagnosis is incorrect practically no harm is done while if correct a great deal of suffering may be avoided.

3. In acute cases open to the medulla and pack the wound. Prognosis good. The treatment and prognosis varies of necessity somewhat in these early cases but in general the earlier the operation the better the prognosis.

4. In cases where bone destruction has taken place seen less than three months after the onset of the disease perform subperiosteal resection when possible. Prognosis good.

5 In chronic cases of bone abscess of less than one year's duration drain and pack. Prognosis good.

6 In chronic cases with bone destruction of less than one year's duration remove sequestrum and pack. Prognosis good.

7 In old chronic cases either with bone destruction or of the bone abscess type remove necrotic areas and drain. Try to obliterate the cavity with flaps of living tissue. If this cannot be done either use bone wax pack or sterilize the cavity allow it to fill with blood-clot and close without drainage. The prognosis if the cavity can be obliterated is fair otherwise poor.

8 The treatment when such bones as the pelvis are involved is unsatisfactory and the prognosis problematical.

9 When in old chronic cases the whole shaft of a long bone is badly diseased the possibility of resection of the entire shaft with bone transplantation should be considered before amputation is resorted to.

ACUTE DIFFUSE CASES

CASE 15 Male 3 years December 8 1909 One month ago fell from bicycle injuring left hip. I began injuring same hip one week ago. Since then patient has been sick, bed with severe pain, no high fever. Examination: The left hip is held rigid, just below the crest of the ilium is a tender red fluctuant area. Temperature 38.5 pulse 100 leucocytosis 7,000. X-ray negative. Operation: Three inch incision over crest of ilium. Abscess opened, no bone found bare of periosteum. Culture: *Staphylococcus aureus*. Two days later the incision was enlarged and a pocket opened into pelvis. A third operation was done one week later and new pocket re-opened. Convalescence stormy. Discharged May 1910 with sinus. Mother reports no operations for sequestrum. Another city and operated on for bone abscess of humerus. Now has small sinus and walks with slight limp.

CASE 77 Male 9 years March 2 1913 One week ago left shin somewhat sore that night. Two days later became swollen and next day left forearm and right elbow became swollen and tender. Patient had high fever and was irrational at times. Examination: Very sick boy temperature 40 pulse 100 leucocytosis 15,000 lungs with many rales. There was an abscess over the lower end of the left ulna and the lower end of the right humerus. All lower leg was much swollen, red and tender from knee to ankle. X-ray negative. Operation: Incision over tibia and the periosteum and entirely stripped off. Abscess extending from popliteal space to ankle. Bone trephined and the medullary cavity found full of pus. Abscess also in center of left ulna, and lower end of right humerus trephined. Culture: *Staphylococcus aureus*. Died on the fifth day with septicaemia, parotitis and multiple abscesses of the soft parts (autopsy).

CASE 85 Male 3 years May 1 1913 5 days ago fell, injuring right ankle. Next day ankle was painful. Two days later the patient was sick in bed with high fever

pain, chills, and delirium. Examination: Sick delirious boy, mouth foul, chest negative, right leg swollen and tender over upper third of tibia, pulse 120, temperature 103, leucocytosis 18,000. X-ray negative. Operation: Incision over tibia and the periosteum found entirely stripped off the whole length of bone by pus. Tibia divided in center and removed in 6 pieces. Culture: *Staphylococcus aureus*. May 11 focus opened at the lower end of the left radius. May 13 focus opened at the lower end of the left tibia. May 15 operation for osteomyelitis of eighth rib on left. May 14 operation for osteomyelitis of crest of left humerus. Patient has pyelitis. May 24 pericarditis with effusion. June 8 590 ccm of fluid withdrawn from left chest. June 26 750 ccm of fluid withdrawn from left chest. June 7 900 ccm of fluid withdrawn from abdomen. July 1 1,000 ccm of fluid withdrawn from right chest. July 31 operation for osteomyelitis of tibia and peroneal (the right radius X-ray shows evidence of abscess of the humerus). September large pectoral abscess opened. February 1914 operation for osteomyelitis of head of the left fibula. March 1914 operation for osteomyelitis of first right metatarsal. All other wounds solid. April 25 1914 bone graft from crest of left tibia to defect where the right tibia has not regenerated. August 1914 two solid bone grafts united at one end and cretae gradually increase.

CASE 66 Female 7 years six months September 1913 Patient was without cause pain in the left hip. Since then sick and feverish. Examination: Negative except for hip. This was tender and motions limited. Temperature 101 pulse 100 leucocytosis 30,000. X-ray negative. Operation: Incision over trochanter bone trephined, no pus but culture showed *Staphylococcus aureus*. Two days later operation for osteomyelitis of right fibula, bone trephined in six places. Five days later large abscess over ilium and most of the bone found destroyed. (This was apparently the original focus.) Slow convalescence. Two months later greater part of ilium removed. Two operations since for small sequestra. At present there is a discharging sinus at the hip, the fibula well.

ACUTE LOCAL WITH BONE DESTRUCTION

CASE 18 Female 10 years April 1910 Two weeks ago attack of fever and vomiting and right ankle became swollen. Examination: Red tender swelling over the right heel and lower leg. Temperature 103 pulse 120. X-ray shows osteomyelitis of os calcis. Operation: Incision over bone and trephined opening made. Considerable pus obtained. Culture: *Staphylococcus aureus*. Culture from blood, *Staphylococcus aureus* and influenza bacilli. Died on the eighth day of meningitis and septicaemia (autopsy).

CASE 58 Male 3 years six months November 1911 One week ago began to walk lame and complained of pain in the left leg. Some fever and fretful. Examination: Head, left tibia slightly thickened and tender. Temperature 101 pulse 100 leucocytosis 15,000. X-ray negative. Operation: Incision over head of tibia, periosteum thickened two trephine openings made and pus found in medulla. Bone went on to the formation of sequestrum. Two weeks later hyperostosis resection of the upper third of the tibia was performed. Eight weeks later bone had re-formed and boy was walking on it. Three months after this he fell down stairs and broke the leg. Following this although the fracture healed promptly sinus formed and sequestrum removed. December 1913 In July 1914 the wound was solid and the leg normal.

CASE 6 Male 6 years December 9 One month ago without cause left arm began to swell and has been very tender and painful since. Examination: Middle third of humerus much swollen and tender. X-ray shows

two distinct cavities in bone with periostitis and marked thickening of the cortex. Operation: Three-inch incision much new formed bone about humerus. Abscess-cavity in the shaft opened. Culture, staphylococcus aureus. Wound healed in eight weeks, and although urged to come in patient did not report for sequestrectomy for eight months. He then refused operation. Fourteen months after first operation complained of no trouble and was working as a day laborer.

CASE 67. Male, 33 years, January 1913. Four weeks ago packing case fell on his right knee. Shortly after he complained of severe pain and was laid up in bed for four days. Attempted to work but had to give up. Examination: Lower half of right femur thickened and tender. Motions of joint normal. Temperature 105° pulse 30 leucocytes 7,600. X-ray shows slight periostitis over the lower half of the femur. Operation: Incision over the apex of femur. Five trephine openings made and medullary cavity found filled with pus. Culture staphylococcus aureus. Patient refused operation for sequestrectomy later but was admitted to the hospital six months later with erysipelas at which time many sequestra were removed. Wound solid in eight months from date of first operation and the patient was well one year later.

ACUTE CASES, MILD LOCAL INFECTION NO BONE DESTRUCTION

CASE 8. Male, 9 years, May 1909. Three weeks ago he sprained his right ankle. Since then it has been swollen and tender but he is able to walk with a limp. Examination: Over left tibia: ternal malleolus is a red tender swelling. X-ray shows a distinct cavity in the lower end of the tibia. Operation: Tourniquet. Three-inch incision over lower end of tibia. No cavity opened, which contained pus. Cavity sterilized and filled with bone-wax. Wound closed without drainage. Wax began to discharge on the seventh day. Wound healed in four months. X-ray one year later shows no trouble with tibia.

CASE 10. Male, 35 years, June 1909. In September 1908, he suffered a severe attack of pain in right leg just below the knee and was confined to bed for three months. Pain recurred two months ago and the patient as operated upon at the hospital for osteomyelitis of the head of the tibia. Since healed, on month. Two weeks ago admitted for pain and tenderness over the head of the fibula. Operation: Two-inch incision over head of right fibula. Cortex removed and cavity found filled with granulation tissue. Cavity sterilized and wound closed without drainage. Healing by first intention. Culture unknown bacillus. Wavermani post. One year later patient report that he is perfectly well and has had no trouble since operation.

CASE 20. Male, 13 years, September, 01. One month ago a pimple formed on the outer side of left leg just below knee which broke spontaneously. There was little pain. Examination: There was a sinus over the head of the left fibula extending to the bone. X-ray showed slight periostitis. Operation: Incision over head of fibula. No abscess found in the soft part. Second incision over head of tibia and bone trephined opening a cavity one inch in diameter. Wound closed and packed. Eighteen months later report by letter that the wound healed promptly and he has had no trouble since.

CASE 24. Female, 35 years, May 1911. Three days ago fell on right leg. Since then has not been able to walk and suffered severely from pain at night. Examination: Lower third of right tibia swollen and somewhat tender. Temperature 100° pulse 90 leucocytes 4,600. X-ray negative. Operation: Tourniquet. Three-inch incision over lower end of tibia. Some hemorrhage in the

soft parts. The periosteum was found thickened. Two trephine openings were made in the bone and a small amount of bloody pus evacuated. The wound was packed. One year later the patient reports that wound healed promptly and she has no trouble since the operation.

CASE 41. Male, 4 years, May 9. Three days ago patient woke up in the night crying because of pain in the thigh. She has been feverish and restless ever since and cannot stand or walk. Examination: Marked thickening of the great trochanter on the right. Motions were somewhat limited. Temperature 103° leucocytes 28,000. Operation: Three-inch incision over trochanter. Small amount of pus about bone. Trephine opening made and 15 drops of pus found in medulla. The cavity was packed. Culture staphylococcus aureus. Healed in two months well one year later.

CASE 44. Male, 7 years, May 19. Two weeks ago twisted his right leg. Since then he has had some pain which confined him to bed for the last three days and he cannot walk. Examination: Motions of right knee perfect. There is a tender point just below tibial tubercle. Temperature 101° leucocytes 8,500. Operation: Two trephine openings are made in the medull just below the knee. The cavity was filled with brownish looking material. The wound was packed. Culture staphylococcus aureus. The wound healed in six months. Well one year later.

CASE 48. Male, one year, six months, July 19. Twelve days ago baby awoke with pain in the right shoulder. Since then he has been fretful, somewhat feverish, and will not use arm. Examination: Considerable thickening of right humerus and about shoulder. Motion of joint perfect. There is some tenderness over the upper end of humerus. Temperature 101° pulse 40, leucocytes 54,000. X-ray negative. Operation: Two-inch incision over head of humerus. Medullary cavity opened with burr and pus found. Large abscess also in soft parts. Wound packed. Culture staphylococcus aureus. Well one year later.

CASE 5. Male, 16 years, August 9. Pain in the right knee for two months. Numbness. Pain has not been sufficient to keep him in bed but he walks with cane. Examination: The upper end of tibia is swollen and tender and there is slight thickening. Motions of knee perfect. X-ray shows thickening of the third of tibia with question of an abscess cavity in the head of the bone. Operation: Incision over upper part of tibia. Periosteum thick. Cort over head of bone removed, opening large bare cavity. Cavity sterilized and filled with bone wax. On seventh day first operation sinus formed with discharge of the wax. Wound healed five months. Well eighteen months later.

CASE 63. Female, months, December 9. Ten days ago without cause the child became restless and the mother noticed that the left shoulder was sore. Three days later the shoulder became red and swollen. Diagnosis of scurvy made but has not improved under treatment. Examination: Poorly nourished left shoulder swollen and tender. Temperature 101° leucocytes 10,000. X-ray shows some changes at the upper end of humerus. Operation: Incision over deltoid carried to the bone. Trephine opening made into medulla. A frank pus found. Culture pneumococcus. Wound healed promptly and was reported well six months later.

CASE 68. See abstract text.

CASE 70. Female, 7 years, January 9. Three weeks ago hurt her right knee. The patient treated for sprained knee but joint soon became painful and she was then treated for rheumatism and has been gradually getting worse. There was considerable pain and some fever

Examination Poorly nourished girl considerable swelling around lower end of right femur bone thickened and tender. X ray shows slight thickening and periostitis of the lower end of femur. Temperature 103 pulse 130 leucocytes 20,000. Operation 1 1/2 inch incision over the inner side of the lower end of the femur. In the soft part an abscess containing a pt of pus was opened. Bone was bare of periosteum in one place. Trephine openings were made in the med illa which appeared normal. The wound was packed. X ray taken four months later showed a small bone mass the lower end of the femur about one half inch from the trephine opening. At the end of one year a sinus persisted and a second operation was done opening and draining the bone abscess. The sinus still persists.

CASE 91 Male 20 month June 9 3. Five years ago fell hurting his right shoulder. Since then he has been fretful and complains of tenderness and pain in the shoulder. Examination Poorly nourished child considerable swelling over upper end of right humerus movements of joint free. X ray shows some haziness about the head of humerus. Temperature pulse 120 leucocytes 35,000. Operation Incision through deltoid to head of bone. Trephine opening made and pus and rt n found in the medulla. Three openings made. Culture streptococcus. The wound was packed. O year later a letter received from a friend says the child is perfectly well.

ACUTE PERIOSTEAL

CASE 47 Male 64 yrs July 2 912. Fifty four years ago patient was operated on for abscess of the lower end of the right femur and a piece of bone removed. Five weeks ago he felt the same leg was a piece of timber. He noticed the leg has been painful and tender. Examination Lower end right femur swollen and tender on deep pressure. X ray shows periostitis and slight thickening of cortex. Operation An abscess in the soft parts containing a pt of pus was opened and packed. Trephine opening made in the med illa but no cavity or sequestra found. Wound healed two months. One year later.

CASE 60 Male 26 yrs Jan 17 911. Sick in bed three weeks ago with general pain fever and chills. Two weeks ago pain became localized to the right thigh and he has been unable to walk since. Examination Poorly nourished man. Temperature 103 pulse 100 leucocytes 20,000. The right thigh swollen tender and fluctuant from trochanter to knee. X ray periosteal. Operation Six inch incision over upper part of thigh and an abscess containing a pt of pus evacuated. Trephine opening made to medulla at a pt where cortex was bare of periosteum, but bone appeared normal. Culture streptococcus. One year later patient reported well.

CASE 66 Female 5 years May 1913. 4 days ago fell on right arm. The arm swelled and soon became painful. The patient was not able to walk but was helpless and fretful. Examination Over upper part of upper left arm fluctuant tender red area. X ray negative. Temperature 103 pulse 100 leucocytes 20,000. Operation An abscess under the muscle and bone the periosteum was opened. The med illa was not trephined. Culture streptococcus. Wound healed in eight weeks. No further data.

CASE 5 Male 5 years August 1911. Two days ago hit left knee since which time he has had considerable pain, which has been gradually getting worse keeping him awake at night. He cannot use the leg. Examination Knee held rigidly flexed and painful on motion tender fluctuant mass in popliteal space. Temperature 103 pulse 100 leucocytes 20,000. Operation Incision into large abscess in popliteal space dissecting up the muscle

planes to the internal condyle. Opening made in condyle and medulla appeared normal. Culture streptococcus and staphylococcus. No further report.

CHRONIC DIFFUSE LESS THAN 10 WEEKS DURATION

CASE 52 Male 4 years July 1913. Five weeks ago without cause became sick with fever chills and vomiting. Two days later the left leg became painful and swollen, and a local doctor opened an abscess, which has been discharging since. Examination Poorly nourished child left leg flexed at knee and painful on motion all lower leg much thickened and tender. Opening of several sinuses over tibia. X ray shows osteomyelitis with involucrum of practically entire tibia. Operation Incision entire length of tibia and the shaft removed subperiosteally to the epiphyses. Some involucrum left attached to the periosteum. In January 1913 the bone had re-formed from the epiphyses but no regeneration had taken place in the center of the shaft. There was a gap of about three inches. April, 1913, bone was grafted, graft being taken from the crest of the right tibia. July 1913 the graft was solid, and the patient can bear weight on the leg. September 1913 the patient can walk on the leg no shortening.

CASE 53 Male 13 years, October 1912. Two months ago received a blow on the right arm. Three days later the leg became painful and the boy was very sick with fever vomiting chills and pain in his leg. The local doctor at this time opened a superficial abscess which is still discharging. Examination Poorly nourished sick boy all right lower leg much swollen, thickened, and tender several discharges since. X ray shows osteomyelitis of the tibia with destruction of the entire shaft of the bone. Operation Incision from knee to ankle and entire shaft of tibia removed subperiosteally. July 1913 bone was re-formed and patient is walking on leg no shortening.

CHRONIC DIFFUSE CASES 3 MONTHS TO ONE YEAR DURATION

CASE 1 Female 14 years July 1909. Six months ago without cause the patient had an attack of pain in the right knee. Two weeks later two abscesses broke in the center of the thigh and later a third one broke higher up. These have discharged and no pus has been gradually losing weight and strength. Examination The right knee was held flexed and motion was limited. Entire thigh thickened with opening of several sinuses. X ray shows osteomyelitis of the entire shaft of the femur with much new formed involucrum surrounding sequestra. Operation Incision in the outer side of the thigh eight inches and much involucrum and several sequestra removed. Further operation bandaged on account of the patient's poor condition from loss of blood. December 1909 large abscess opened over the trochanter several pieces of bone removed. Patient also had erysipelas. In January 1910 abscess opened just above knee and sequestra removed. March 9 several sequestra removed from crest of shaft. July 1911 a sinus persisted through which much bone could be felt. In May 1912 the wound had been solid for three months and the knee can be flexed to an angle of about 90 degrees. May 1913 patient has been well since last note. Walks without limp.

CASE 26 Female 3 months February 911. Two months ago had an abscess of the right leg which was opened one month ago by a local doctor and considerable pus evacuated. Since then the patient has been discharging. Examination Poorly nourished sick looking baby. On upper side of right thigh two scars, each one inch long. Thigh swollen and tender. X ray shows osteomyelitis involving entire shaft of the femur. Operation Incisions at upper and lower end of femur opening abscess cavities. Later two sequestra were

removed. Wound healed: about four months. Well one year later.

CASE 29. Male 6 years, April, 19. I September 1909 injured his left leg and three days later ankle became sore and swollen. Following this an abscess broke at the internal malleolus. In August 1910 sinus persisted which was curetted out and some dead bone removed. Following this the wound healed for three months. Examination. All the bone thickened with pitting of several sinuses along the crest through which dead bone could be felt. X-ray shows large sequestra and proper two thirds of the bone surrounded by much sequestra. Operation. Three-inch incision over upper end of the bone and several large sequestra removed. No further date.

CASE 30. Male 5 years, April, 1912. Ten months ago lacerated the ankle and a few days later had attack of pain and swelling. At this time the local doctor opened abscess. One month later other abscesses appeared below the head of the fibula. Two months later was told he had osteomyelitis with destruction of the whole fibula but parent refused operation. I March 9 one month ago several pieces of dead bone were discharged through persistent sinus. Examination. Sinus of upper end to the end of fibula on the left entire length of leg seem thickened. X-ray shows fibula thickened and several sequestra apparently lying in bony cavities. Operation. Incision the entire length of the fibula. One sequestra four inches long removed with considerable involucrum and several mill ones. Wound healed in five months. One year later patient was well without lump, and complained of no further trouble.

CASE 31. Male 4 years, June 1913. In October 1913 had many boils on his neck. In November 1913 had a severe attack of grippe which accompanied by pain and swelling of his left leg. Three months later local doctor made an incision over the outer part of the leg and removed piece of dead bone. Since the several small abscesses had broken. Examination. Middle of the leg over the left fibula. The bone seems thickened. X-ray shows several sequestra and considerable new formed bone. Operation. Multiple cavities and several small sequestra found. Large sequestra found the lower end of fibula. Wound healed about eight months. Well one year later.

CHRONIC LOCAL, THREE MONTHS TO ONE YEAR DURATION, BONY DESTRUCTION

CASE 32. Male 9 years, March 9. A week ago the patient suffered attack of headache with pain at the joint, prostration and fever. Late both ankles both knees, and the right elbow became much swollen. The patient also developed pericarditis and rat temperature from 97° in the morning to 103° at night. Three weeks ago an abscess formed at the right knee which was opened. Examination. Poorly nourished and sick boy. Knees, knees, and right elbow swollen and motions painful. Incision over lower part of right tibia. X-ray shows osteomyelitis lower third of right tibia with considerable new formed bone. Operation. Four inch incision at lower end of the right tibia and four trephine openings made in medulla. One year later the sinus persisted. A second operation was done and a large cavity in the lower end of tibia opened and drained. One year after this second operation the patient was well without limp and leg pressed but little thickening.

CASE 33. Female 4 years, March 9. Ten months ago the child fell, striking left elbow. This elbow became red and tender and three weeks later abscess broke which has discharged until the present time. Examination. Left elbow swollen, motion somewhat limited, sinuses on

lower end of humerus. X-ray shows large cavity containing sequestra at the lower end of the humerus. No involvement of joint. Operation. Incision over external condyle and large cavity opened. Two sequestra were removed. The wound was packed. Well one year later. Extension of motion somewhat limited. Flexion perfect.

CASE 34. Male 2 years, April 1911. Six months ago left shoulder became painful without cause and shortly after an abscess broke which has discharged ever since. Examination. Motions of shoulder somewhat limited and several discharging sinuses about upper part of humerus lead to the bone. X-ray shows osteomyelitis of the upper third of the humerus with sequestra and considerable involucrum. Operation. Three-inch incision through deltoid and large sequestrum removed. The cavity was packed. Well one year later. Motions of joint good.

CASE 35. Female 20 years, May 1911. Six years ago the patient was treated for typhoid fever. Three weeks later definite symptoms of osteomyelitis developed and the right hip was operated upon. Two months ago the left thigh became swollen and tender and an abscess broke short distance above the knee. X-ray shows cavity containing sequestrum at center of left femur. Operation. Incision over center of left femur bone trephined, and abscess-cavity opened and drained. Small sequestrum removed. Wound closed without drainage. Healing by first intention. One year later wound closed no symptoms.

CASE 36. Nine months ago left shoulder. Five months ago had sudden pain over left lower leg followed by swelling. There was considerable fever with chills. Later superficial abscess over the head of the tibia was opened by local doctor and has discharged ever since. Examination. Six boys severe swelling over upper half of the left tibia extending to bare bone. X-ray shows many cavities in proper portion of tibia with several sequestra and large amount of involucrum. Operation. Multiple abscess-cavities in head of tibia opened and several sequestra removed. The wound was packed. The wound healed ten months. Well sixteen months after operation.

CASE 37. Female 7 years, March 1913. In July, 1913 patient had septal thumb. August 9 she had an acute attack of pain in the left knee which has caused her to walk lame ever since. December 1913 an abscess broke. Scarpa triangle. At present she has sinus and lumps with limp. Examination. All left thigh thickened red indurated mass. Scarpa triangle with fluctuating center. X-ray shows thickening of upper half of femur with many cavities and several sequestra. Evidently destructive process of mild virulence. Operation. Incision of upper half of femur and large abscess opened. Bone trephined and several sequestra removed from definite cavity. The wound was packed. Culture staphylococcus aureus. All sinuses closed in eight months. Well one year later.

CASE 38. Male 4 years, June 1913. June, 1913 little toe of right foot became painful and became firm. The bone was scraped three months ago, but two sinuses have persisted. Examination. All motions of ankle limited. Two sinuses over lower end of fifth metatarsal and the entire bone thickened. X-ray shows necrosis of fifth metatarsal and considerable new formed bone. Operation. Sequestrum and some involucrum were removed. The wound was packed. Well one year later. Patient walks without limp.

CASE 39. Male 6 years, July 1913. Carbuncle on nose November 9 pneumonia December 9 pneumonia abscess in March, 1913 followed by empyema in May 1913 in July 1913 pus in left upper arm, which has continued ever since with period of remission two weeks ago. Abscess broke. Examination. Poorly devel-

ped suck boy scar in right groin discharging empyema sinus on right two discharging 4 uses over head of left humerus Temperature, 101 pulse 120 X ray shows cavity in the humerus three inches below head with a sequestrum Considerable penostitis Operation Bone approached through incision between heads of humeri cortex trephined and abscess cavity opened sequestrum removed and wound packed Culture staphylococcus aureus Three months later large abscess developed in a popliteal space One year later osteomyelitis of humerus W H The patient has had an operation as for an acute osteomyelitis of the lower end of the radius Empyema as persists

CASE 97 Male 9 years, September 1913 Three months ago follow a chill swimming had an attack of pain followed by swelling left side of jaw He was cry sick for two days One week later local doctor opened an abscess at the angle of the jaw a distal extracted the first and second molars Examination Left side of face much swollen sinus site of third molar tooth X ray shows osteomyelitis of the angle of the jaw with a cavity containing sequestrum Operation Cavity opened sequestrum removed and wound packed No further trouble

CITRONIC CASES SEVERE LONG DURATION DIFFUSE AND LOCAL

CASE 1 Male 28 years September 1908 Twelve years ago had acute osteomyelitis of the tibia and tibia operated on performed in Greece He was well for three years and for the last nine years has had abscesses break on the leg every few months Examination Right leg swollen and brawny Red and tender over the middle of tibia X ray shows bone much thickened and several sites Operation Four inch incision over red area and several cavities filled with pus opened and packed No further trouble

CASE 2 Male 22 October 1910 12 years ago the leg when he was 10 years old has had many abscesses of the left lower leg 4 months ago was operated on for osteomyelitis of the left tibia and abscess cavities in the medulla opened The sinus healed one month ago 6 weeks ago pain and tenderness returned Examination in the red tender area over the middle third of tibia The bone much thickened Operation Cortex removed and abscess cavities found in the medulla below the site of the previous operation Cavity excised and lined and filled with bone wax Closed without drain Wound opened the discharge of pus one week later Healed 4 months Well no year later

CASE 45 See abstract in text
C R 40 Male 25 years June 1911 Had bone abscess when he was 14 years old 15 years of bone was discharged from abscesses of the right humerus scapula femur and tibia Sick for eight years, but perfectly well until month ago when abscess broke four inches below right knee Examination Bone of old abscesses opening 1 1/2 inches below right knee X ray shows cortical thickening and cavity in the upper third of tibia Operation Cortex removed and cavity filled with bone wax lat on tibia and the end cut Flap skin was not fastened from the side filling the cavity The wound healed in a fortnight One year later wound healed but patient complained of pain the lower part of the tibia Operation Abscess in the medulla lower third of tibia opened and operated in similar first performed

CASE 55 Male 26 years, October 1912 When 11 years old had typical attack of osteomyelitis of the right tibia was persuaded to three years, after which he healed W H In three years ago when abscess formed at the lower end of the tibia The discharge a short time and then healed Three months second abscess formed

and was opened Examination All right tibia thickened and leg showed multiple scars Sinus at lower third of the tibia X ray shows cortex of entire tibia thickened with penostitis and an abscess cavity in the lower third of the bone Operation Cortex removed, opening abscess in medulla in lower end of tibia Cleaned out and flap of skin swung in from the side to fill the cavity Wound healed in 14 weeks Well one year later

CASE 60 Male, 24 years, November 1912 Seven years ago had a typical attack of osteomyelitis of the right tibia and was operated upon in Greece Discharging sinus for two years but well for the last five years Two months ago an abscess formed over the lower end of the tibia which was opened Examination There were many scars over the right tibia The bone was much thickened X ray shows much cortical thickening cavity at lower third of tibia Operation Abscess of medulla at lower end of the tibia opened bone at the sides removed from forming the cavity into shallow trough Two sequestra also removed Skin flap swung in from the side Healed in nine weeks Well one year later

CASE 61 Female 4 years December 1912 Suffered an attack of acute osteomyelitis of the ulna when 12 years old Several pieces of bone were discharged from us at that time Well until four years ago when the patient had rheumatism in the arm which subsided in a few weeks Two weeks ago the pain in the arm returned and has been very severe Examination Tender scar over lower two-thirds of left ulna X ray lower portion of ulna appears normal The upper two inches thickened and contains two cavities Operation Burned bone over upper portion of ulna removed and two small cavities opened Cavity treated with carbolic acid and alcohol allowed to fill the blood-clot and wound closed without drainage Healing by first intent on Well one year later

CASE 72 Male 62 years February, 1913 An attack of acute osteomyelitis when 12 years old following influenza Both femora, both tibiae and the right humerus involved Patient has had severe restriction of motion of hips and knees Ten years ago abscesses formed and broke on both ankles 11 years ago the right patella was fractured For 6 months patient has been sick in bed with rheumatism of the left thigh Examination Multiple scars over bones mentioned above right knee stiff and kylosed motion of hip limited feet badly deformed X ray of left femur shows the lower end much thickened with a question of an abscess in the medulla Operation Four inch incision over lower end of left femur Cortex removed and large abscess opened and packed Culture staphylococcus aureus Wound healed in 4 months Well two years later Symptom free

CASE 75 Male 62 years February 1913 An acute attack of osteomyelitis of the right tibia when 12 years old 4 years ago, but was healed after the discharge of a piece of dead bone Several similar attacks since Well now twenty-two years Four months ago he had an attack of rheumatism of the right ankle which he persisted Examination Right tibia much thickened and leg pressure in the tibia is considerable edema and tenderness about knee X ray shows cortical thickening and several small abscess cavities the lower end of the bone Operation Abscess opened, locs of cavity cut away, and skin flap swung in from the side Well one year later

CASE 76 Male 44 years March, 1913 When 12 years old patient had an attack of acute osteomyelitis, originally of the right femur Both right knee femur and a rib involved 1909 sequestrum was removed from the femur In 1911 the right knee was excised and the

joint was disintegrated. Union was poor and several abscesses have formed since. Patient desires amputation, as the leg is short and useless. Operation: Amputation of thigh.

CASE 40. Male 58 years, July 1913. When a boy the patient had an abscess below left knee following trauma. A piece of bone was dislocated after which the union healed. One and one half years ago the second abscess broke which was cured. A sinus has persisted since. The last four days the patient has had great pain in the leg and severe prostration. Examination: Patient has erysipela. Is also a cardio-renal and has chronic bronchitis. There is a sinus on the head of the tibia. X-ray shows large abscess cavity in the head of tibia. On account of the patient's general condition no operation was performed. One year later the sinus persisted but the man had been working regularly as a day laborer.

CASE 39. See abstract in text.

BONE ABSCESS LESS THAN ONE YEAR DURATION

CASE 34. Male 153 lbs, May 1909. At the right knee four months ago had been in bed six weeks with rheumatism. Examination: A tender red area at the head of the left tibia bone seems much thickened. X-ray shows marked thickening of the head of the tibia with some periostitis and a bone-cavity. The medial line. Operation: Abscess in soft part opened, cortex removed, no abscess in the head of tibia opened, sterilized and filled with bone wax. Culture: staphylococcus aureus. Wound opened with the discharge of pus a few days. There were some pus pockets; soft part of ring confluence. Wound healed in six months. Well one year later.

CASE 16. Male 16 years, July 1905. Four months ago a boil formed and broke just below the left knee. This he led badly, but second abscess broke below it. For the last two months he has had a red area on the leg and has been unable to walk. Examination: Red fluctuant area below the left knee head of tibia thickened four inches below the knee there is a pus cavity. X-ray shows two separate cavities occupying the upper third of the tibia. Operation: Cavities opened, sterilized and filled with bone wax. Culture: staphylococcus aureus. The sinus persisted ten months. Well two years later.

CASE 24. Male 15 years, December 9. Eight months ago following a fall the patient had a red right thigh which was swollen and painful for two weeks. The pain has been worse recently. Examination: On upper external aspect of right thigh a red fluctuating, tender area. X-ray shows some periostitis and a bone abscess short distance below the trochanter. Operation: Abscess opened, no cavity packed. Culture: staphylococcus aureus. Healed seven months. Well eighteen months later.

CASE 3. Male 284 lbs, May 1910. Blow on left knee ten months ago following this knee became swollen and tender and operations were performed the first at another hospital. The sinus closed but one week ago the knee became worse again and a abscess broke. Examination: Two sinuses over lower end of right femur. He is slightly flexed, no motions very much limited. X-ray shows cavity in the lower end of the femur with considerable cortical thickening. Knee joint is evidently involved. Operation: Incision on outer aspect of the lower end of the femur, medulla trephined, bone abscess drained. Cavity cleaned out and filled with bone wax. Culture: sterile. Several pockets of pus, the soft part of ring confluence. Wound drained for eight months. Well two years later. (X-ray).

CASE 81. See abstract in text.

BONY ABSCESS OF SEVERAL YEARS DURATION

CASE 2. See abstract in text.

CASE 5. Male 4 years, May 1909. Acute attack of osteomyelitis of the four years old and since then abscesses have broken out once a year. Previous operations: Examination of the scars over both tibiae, right radius left humerus, no rib to the right of right tibia is swollen, tender and fluctuating. X-ray shows typical bone abscess four inches above lower end of right tibia. Surrounding bone is not much thickened. Operation: Cortex removed, cavity opened, cleansed, and filled with bone wax. Culture: staphylococcus aureus. The wound was closed without drainage. A week later the sinus opened and was discharged for some time. Well thirteen months later but better last factory.

CASE 6. Male 30 years, May 1909. Twelve years ago following trauma patient had osteomyelitis of the lower end of the femur. Three operations were performed in Sweden after which the sinus healed. One month ago the pain in the leg returned keeping the patient awake at night. Motion of the knee were limited. Examination: Scar on inner side of femur just above knee lower end of bone thickened and tender. X-ray shows bone-cavity in lower end of femur surrounded by thickened bone. Operation: Abscess opened and packed. Following operation the patient had repeated hemorrhages and the hemoglobin dropped to 35 per cent. Three years later sinus persisted, and the condition was the same as before operation.

CASE 7. Male 26 years, May 1909. Nine years ago, without cause the left knee became worse and later abscess broke. The patient was in bed nine weeks. He was well for two years. For the past seven years an abscess has formed at the lower end of the femur every six months. Examination: Left tibia swollen red, and tender. X-ray shows bone-cavity in the lower end of the femur and cortex much thickened. Operation: Cavity opened, cleaned, dried and filled with bone wax. Wound closed without drainage. Culture: staphylococcus aureus. A sinus formed few days after discharge of the bone wax. The wound healed in six months. Well one year later.

CASE 1. Male 3 years, July 1909. Seven years ago without cause an abscess formed in the right knee with discharge of pus. Operation three years ago, at which time sequestrum was removed. Well until three months ago when the abscess broke again. Examination: There is a sinus over the head of the tibia leading to bare bone. X-ray shows typical bone abscess cavity head of tibia. Operation: Cavity in head of tibia opened and packed. Following operation knee joint became infected, necessitating resection. One year later the osteomyelitis is well. The patient can walk but the knee is stiff.

CASE 4. Male 36 years, November, 1909. When 4 years old the patient had an acute attack of osteomyelitis of the right foot and upper end of right humerus. Two years later and two years after that another abscess formed. Patient is well now for fifteen years. Two weeks ago, following trauma he had an attack of acute pain in the right foot. Examination: Over head of first metatarsal is red, tender fluctuating area. X-ray shows bone abscess head of first metatarsal. Cavity opened, cleaned and allowed to fill with blood clot and the wound closed without drainage. A sinus formed one week later. No further report.

CASE 7. Male 36 years, March 1910. Eight years ago he had an attack of pain in the right upper arm. One year ago he was operated upon for osteomyelitis of the humerus and cavity was drained. Seven weeks ago the arm became swollen again and was removed. Examination: At the center of the right humerus is tender red area.

the bone is thickened X ray shows two connecting cavities in center of humerus Operation The cavities were opened sterilized, and filled with bone-wax. The wound was closed without drainage Following operation the patient had complete paralysis of the brachial plexus, which lasted three weeks The wound was opened shortly after with a discharge of serum and wax Ten months later the pain in the arm recurred and X ray shows the cavities as before operation

CASE 21 Male 2 years October 1910 Four years ago an abscess formed on the right ankle and broke The wound healed and the patient was well until six months ago when the ankle became painful and swollen The pain has persisted until the present time Examination shows slight thickening at lower end of the right tibia and scars of previous operation X ray shows bone abscess at lower end of the right tibia The abscess was opened sterilized filled with bone-wax, and the wound closed without drainage A sinus formed a short time later discharged serum and wax No further report

CASE 5 Male 35 years February 1911 Acute osteomyelitis 20 years ago involving both tibia and both humeri One year ago an operation was performed on the right tibia Two months ago an abscess on the left shoulder broke but healed promptly Examination There is considerable thickening around the head of the left humerus X ray shows a typical abscess-cavity of the head of the humerus with a considerable thickening of the cortex The abscess was opened the cavity sterilized allowed to fill with blood-clot, and the wound was closed with a small drain Healed in three months Nine months later an abscess broke in the scar One year after this patient reported well Culture staphylococcus aureus

CASE 8 Female 7 years, March 1911 Attack of acute osteomyelitis: the lower end of the femur six years ago following a fall Two previous operations Examination There is sinus above the knee on the right the bone is thickened X ray shows the bone much thickened probably masking a cavity in the medulla Operation Large abscess-cavity in the medulla opened cleansed allowed to fill with blood clot and closed with small drain Culture staphylococcus aureus The sinus healed in about a month One year later patient returned and an X ray showed an abscess as before A second operation was done and the abscess packed The sinus persisted, and at the end of the next year third operation was done and a flap of the muscle wing bilaterally the cavity; the bone The sinus closed in about six months Well a year and a half later

CASE 3 Female 30 years April 1911 Four years ago, without cause patient had a attack of rheumatism; the right shoulder Two years ago had a similar attack Three months ago pain returned and has persisted Examination Some spasm of muscles over right shoulder and little limitation of motion X ray shows two distinct cavities; the upper end of the humerus and the cortex thickened Operation In the upper end of the humerus were two cavities which were filled with pus These were opened and packed The wound healed in two months Abscess recurred six months later

CASE 57 Male 9 years October 1912 When four years of age had rhyssels and osteomyelitis of the left humerus Well until six weeks ago, when without cause he had a attack of pain in the left arm Examination Lower third of humerus tender and swollen Motion of joint free but painful X ray showed abscess-cavity three inches above the elbow cortex not thickened Operation Abscess opened and cavity obliterated by a flap of muscle from the triceps Culture staphylococcus aureus Sinus persisted for six months Well one year later

CASE 71 Male 30 years February 1913 When six years old had an abscess of the left shoulder followed by a discharging sinus for six years No trouble until three years ago when an abscess formed and a sinus has persisted For three weeks has had severe pain in the left shoulder with chills and fever Examination Well developed sick man Temperature 103.5° pulse 130 leucocytes, 26,000. Opening of sinus near axilla on the left and two scars over the head of the left humerus X-ray shows upper end of humerus much thickened, and probably containing an abscess-cavity Operation Incision through deltoid, large abscess of soft parts opened cortex removed and abscess in head of humerus drained and packed Convalescence stormy Abscesses formed on the right forearm over left fibula and the left thigh in right groin in the abdominal wall and right axilla Patient also developed panophthalmitis, with a loss of left eye Culture from all abscesses, staphylococcus aureus blood culture sterile Eight months later general condition good but persistent sinus over left shoulder

CASE 74 Male 28 years, February 9 13 When 13 years old had an attack of pain about center of right humerus and for the past ten years has had occasional similar attacks Four years ago an abscess broke at this point which healed Four months ago pain returned and has been present since Examination Scar at center of right humerus X ray shows marked thickening of cortex probably masking an abscess-cavity Operation Incision over outer side of humerus cortex removed, and large abscess in center of bone opened Flap of triceps swung into cavity obliterating it Culture sterile Healing was by first intention No further report

CASE 84 Male 6 years April, 1913 Ten years ago injured right ankle One year later foot became swollen and painful but symptoms subsided in two weeks This has happened about every six months since that time Examination Negative, except for tender point behind external malleolus X ray shows small cavity on the outer posterior part of the tibia Operation Cavity opened with difficulty tenured, and packed Culture no growth Wound healed slowly with some pocketing of pus in the soft parts No further report

CASE 90 Male 24 years June 9 13 Abscess of left leg 5 years ago which has broken open seven times since Eight years ago patient had an abscess in right flank five years ago he had an abscess on the right leg three and one half years ago he had an abscess over the right arm Three years ago an operation was performed for bone abscess in center of the left humerus Three weeks ago he had severe pain over left arm Examination Scars at sites of old abscesses left humerus about center swollen red and tender X ray shows large bone abscess cavity occupying upper two inches of humerus Operation Incision through deltoid cavity opened and found full of pus Much cortical bone was removed The cavity was packed Culture staphylococcus aureus The wound healed in three months Well one year later

CASE 9 Male 7 years June 9 13 Three years ago injured right thigh while playing football Three months later an abscess was opened One year later the left foot painful and an abscess formed at that point One year ago he had pain in left knee followed by trauma which has been getting steadily worse Examination Upper end of left tibia thickened and slightly tender X ray shows very large abscess at the upper end of the tibia Operation Abscess-cavity two by four inches and contained 1.5 ounces of pus the head of tibia opened Sides of tibia cut away and displaced to one side in attempt to obliterate it Healing was slow and wound closed; about nine months, but small abscess has broken twice since then

BOVE ABSCESS, KISTING CASES

CASE 13 Female, 38 years August 1909 Two years ago without cause had severe pain center of left tibia Similar attacks have occurred every two to four months since Examination Slight tenderness at center of left tibia with some thickening of bone X ray shows a definite cavity at center of tibia with some thickening of the surrounding bone Wassermann negative Operation Cortex removed and several cavities filled with clear fluid, opened sterilized, allowed to fill with blood clot and closed without drainage Healing was by first intention Eighteen months later reports she is well X ray at this time shows normal bone and no cavity

CASE 38 Female, 3 years April 91 Injured left ankle when six years old, following which an abscess broke This healed after the discharge of dead bone in about 1 year Since then repeated attacks of pain in the right shin after hard work Examination The right leg is one half inch shorter than the left At the upper third of the tibia the bone is thickened but not tender Scars over lower end of that bone Wassermann negative X ray shows cortex much thickened, no evidence of cavity Operation Incision over upper third of tibia cortex removed and cavity one and one-half inches long filled with clear fluid and containing small sequestrum opened sterilized allowed to fill with blood-clot, and closed without drainage Healing was by first intention Well fifteen months later

CHRONIC PERIOSTEAL

CASE 9 Male 5 years July 90 In 895 had typhoid fever Three weeks later abscess broke in several parts of the body which later discharged small pieces of bone and then healed Sinuses about right hip, however persisted Since then he has had operations for osteomyelitis of right femur without cure Examination Motions of left hip limited, opening of a sinus in groin X-ray shows thickened irregular bone about trochanter and neck of femur Operation Considerable involucrum and several sequestra removed from the upper end of left femur The cavity was packed The sinus discharged for a year after operation, when two sequestra were discharged and the wound healed The wound has now been solid for over a year

CASE 57 Male 2 years April 91 Five years ago injured left thigh Following this had more and more constant pain in the left hip and one year later was operated upon and the bone scraped He was perfectly well for 1 year, when an abscess opened and a sinus has persisted since Examination Scar on right trochanter with opening of the sinus, through which dead bone may be felt X-ray shows no cavity in the bone but slightly thickened cortex and roughened periosteum over the trochanter Operation Incision over bone and abscess of soft parts at head of trochanter extending into the bone The cavity was cleaned out and some bone removed The wound closed with small drain Reports 8 months later that the wound healed few months and has been well for over a year

CASE 78 Male 33 years March 93 Three years ago without cause had severe attack of pain in the left femur below the trochanter sick five weeks Well until 15 months ago, when pain returned and leg became swollen Leg typed by doctor who drew out pus of pus Formation Pupils normal knee jerks present over left femur below trochanter a fluctuant swelling motions of knee limited X-ray shows cortex of bone at trochanter very much thickened suggesting syphilis Repeated Wassermann test negative Operation Incision over femur and the pus of clear fluid found directly over the bone The cavity was lined with granulation tissue and

extended from knee to trochanter The periosteum was thickened and fibrous Incision to medulla which appeared normal The wound was sterilized and closed without drainage Culture staphylococcus aureus Three weeks later X-ray showed process more marked in bone and fluid had re-accumulated A sinus formed later One year later patient reports that sinuses have persisted Advised to have further X-rays and treatment but refused

CHRONIC EPYPHYSIS

CASE 23 Male 7 years 10 October 91 Eight months ago lacerated in the right heel by horse Shortly after this an abscess formed at this point which healed but broke open again a few weeks ago Examination Right heel swollen and tender On inner side opening of the sinus, and X-ray shows disease of the epiphysis of the os calcis. Operation Cavity in epiphysis curetted and packed Well 1 month later One year later reports no trouble

UNCLASSIFIED CASES

CASE 5 Male 4 years July 91 Nine months ago had acute attack of osteomyelitis of the left tibia and subperiosteal resection was done six weeks later A large portion of the shaft of the tibia however the two ends was not removed and these represent now as sequestra The middle third of the tibia has regenerated Operation Several sequestra removed from the upper and lower end of tibia with considerable sequestrum. Wounds healed in few months One year later wounds solid, no shortening of leg and patient without limp

CASE 38 Male 5 years, February 913 A acute attack of osteomyelitis of the right tibia ten months ago Six weeks later portion of the half of the tibia was excised, but piece of bone was left at the upper end lower end, and sinuses have persisted since Operation Large sequestra removed from upper and lower end of tibia Wound packed Wound healed in six weeks One year later wound solid, no shortening of leg and no symptoms

SECONDARY CASES

CASE 3 Male 23 years May 91 Tuberculosis of head of third metacarpal bone Patient also has tuberculosis of lungs Cavity in bone cleaned out, filled with bone-wax and wound closed without drainage A sinus formed later discharged pus The wound healed six weeks Well one year later

CASE 56 Male 7 years October, 92 Tuberculosis of rib Abscess over heart broke when 3 years old and a sinus has persisted since Examination The fifth rib in junction with the costal cartilage is necrotic Operation One and one half inches of the fifth rib excised and wound closed without drainage He lung was by first intention Well one year later

CASE 6 Female 30 years, December 91 Tuberculosis of spine A case of streptococcal infection of a large tubercular focus of the back Abscess opened and patient transferred to orthopedic department

CASE 76 Female 9 years March 93 Tuberculosis of right femur Pain right knee without cause for four months, which has confined her to bed for some time Some loss of weight and night sweats Examination General condition poor Right thigh swollen and fluctuant Temperature pulse 90 X-ray shows low end of femur thickened and probable abscess at about center of shaft Operation Abscess soft part contain pus and pus opened The cortex was removed and a small abscess in the center of the bone opened and packed The wound did not do well and many abscesses opened in the soft parts in the next month Patient also developed large abscess of back Died in two months A biopsy showed tubercu-

lous of lung spleen adrenals small intestine spine and femur

CASE 83 Male 30 years, April 1913 Tuberculosis of femur Operated upon one year ago for osteomyelitis of right femur but was not relieved Operation Large abscess in soft parts opened and cavity in trochanter drained Specimen removed showed tuberculosis Patient was not relieved and hip-joint amputation was performed six months later At present he still has a sinus but his general condition is better

CASE 89 Tuberculosis of first left metatarsal and third right metatarsal bone Wassermann negative Skin tuberculin test positive Transferred to orthopedic department

CASE 94 Female, 11 years August 1913 Tuberculosis fifth metacarpal Abscess over outer side of right hand seventeen months ago which has been discharging ever since Examination The fifth metacarpal is thickened and there is a sinus at the center of the bone Wassermann negative X-ray showed cortex thickened and two cavities in the bone Operation Large cavity opened and filled with caseous material and granulation tissue Cavity cleaned out and packed Healed in five weeks Well one year later

CASE 3 Male 7 years January 1909 Sepsis following fracture of tibia Large cavity opened and fragment of bone removed from lower end of tibia Accidental death shortly after operation

CASE 82 Male 15 years, April, 1913 Osteomyelitis following fracture of tibia Nine months ago broke both bones of left leg at the lower third Three months later had erysipelas of that leg at which time an abscess broke at the site of the fracture A sinus has persisted since Examination There is some thickening at the site of the fracture and opening of the sinus X-ray shows definite cavity in tibia Operation Cavity in medulla of tibia one by two inches in diameter opened Flap of skin swung into cavity from side In the next six months patient had erysipelas twice One year later the sinus had closed and the patient walked without limp

CASE 9 Male 67 years, June 1909 Necrosis of metatarsal in diabetic patient For six weeks has had an ulcer over the ball of the great toe on the left Examination There is an indolent ulcer at the bottom of which bare bone can be felt X-ray shows necrosis of head of first metatarsal Operation Necrotic bone removed and wound picked The wound healed in five weeks Well one year later

CASE 7 Male, 23 years May 1911 Osteomyelitis from direct extension of sepsis Septic hand two years ago Since then has had two sinuses a palm of hand Examination Three sinuses present on the third metacarpal bone

X-ray shows necrosis of entire bone Operation Excision of finger and metacarpal bone Following operation there was a streptococcal infection of the hand and arm The patient was very sick for six weeks One year later the wound was solid and motions of finger good considering the sepsis A useful hand

CASE 33 Female 22 years May 1912 Osteomyelitis from direct extension of sepsis Osteoma at head of tibia removed four years ago Following this a sinus formed and three operations were performed for osteomyelitis of the head of the tibia Examination Scar below knee patient walks with slight limp and complains of constant pain over head of tibia X-ray shows a cavity in the head of the bone Operation Cavity cleaned out and flap of skin swung in from the side obliterating the cavity Tip of flap sloughed but wound healed in five weeks Well one year later

CASE 64 Male 43 years December 1911 Osteomyelitis from direct extension of sepsis Three years ago had a septic bunion of the left foot Six months ago injured his foot again and was in bed eleven weeks with a discharging sinus Examination First great toe and first metatarsal on left have been removed A sinus was present over scaphoid extending to dead bone Many other scars on the foot Wassermann negative Operation Incision over scaphoid and part of the bone is apparently necrotic Bone curetted out and cavity packed Well one year later

CASE 54 Male 22 years October 1912 Syphilis Pain in left knee for two years without cause It has never been severe but it has kept him from work at times He is worse at night and walks with slight limp Examination Upper third of left tibia tender and slightly thickened An X-ray shows marked thickening of cortex of the upper third of the tibia Wassermann strongly positive Salvarsan Well one year later

CASE 66 Female 7 years January 1913 Syphilis Four weeks ago had an acute attack of pain in the right leg followed by tenderness and swelling over the skin Examination Poorly nourished colored girl Tibia thickened tender and skin seems hot X-ray shows marked periostitis of center of shaft no evidence of disease of the medulla Temperature normal pulse 80 Macular rash on lower extremities Wassermann strongly positive Salvarsan No further report

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INTESTINAL STASIS

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In a discussion upon intestinal stasis a single speaker can touch only very lightly upon any particular aspect of this most interesting problem. The literature which has already accumulated is so vast and the claims made as to the importance of the condition are so far reaching that anything in the nature of a close criticism of the matter having regard to brevity is impossible.

It is asserted (a) that certain bands, webs, veils or membranes are present at defined points in the alimentary canal; (b) that these adhesions are responsible for delay in the onward transmission of the intestinal contents and consequently for increased decomposition in them and further that the organisms so proliferating or other noxious products are absorbed into the system and produce certain deleterious effects; (c) that certain disorders are due exclusively to the toxæmia which comes from such absorption or from subinfection and that a very large number of the diseases to which man is liable are also harmfully influenced thereby.

What truth is there in these various statements? Of the existence of various membranous adhesions along the course of the alimentary canal there can be no doubt. Between the duodenum and the gall bladder or the under surface of the liver at the duodeno-jejunal flexure at the end of the ileum along the ascending colon at the hepatic and splenic flexures and to the outer side of the pelvic colon they are plainly and frequently to be seen. Their origin is not yet certainly ascertained and it may indeed not always be the same. Certainly many of them are congenital. When in 1899 I published my work on Retroperitoneal Hernia I had examined the abdomens of a large number of fetuses, children and young adults in order to discover the number, nature and extent of the peritoneal fossæ. I found and there recorded the fact that adhesions of the proximal jejunum and the terminal ileum were

not seldom found in these cases and that they were due to the condition described by Goldt as physiological fusion. The membrane which binds the ascending colon so loosely to the posterior abdominal wall—Jackson membrane as it is called though Lane not only described but depicted it—has a vascular supply of such regular appearance that it seems impossible that it should be anything other than a developmental relic. The origin of the band at the hepatic flexure and of the more obvious and thicker string like adhesion at the splenic flexure, is probably as Lane asserts the result of traction and the effort to restrain or overcome its effects. Of the existence of these several membranes therefore there is no doubt. There is little doubt also that they are for the most part congenital though mild inflammatory processes or the response of the parts to dragging force applied to them may be responsible for their increased development. If the support of the bowel were in need of reinforcement it is probable that strength would be added to membranes already existing rather than that entirely new bands should be laid down. When once these adhesions are formed they may of course hamper the free action of the intestine.

It is often said that in cases of intestinal stasis an obstruction exists at the site of one or another of these bands and that long delay of the contents of the bowel is caused thereby. This does not tally with the general operative experience. Every surgeon who has much experience of the intestine in these cases will agree that as a rule the wall of the gut is thin and almost translucent; it is not as we see it in cases of veritable obstruction thick from hypertrophy of its muscular wall. It is feebleness of action rather than impediment which causes the tedious transit of food. The walls of the gut are thin, the membranous supports are of such poor quality that parts normally well fixed like the splenic flexure can often be withdrawn from the abdomen.

and the musculature of the abdominal wall is flaccid and feeble. Everything indicates that a sort of apathy is as a rule the cause of stagnation not an obstruction which is with difficulty overcome.

We may therefore take it as proved that the various bands described in connection with the intestine do exist though we may dispute as to their origin. We may agree also that undue delay in the forward transmission of the intestinal contents does occur and that this delay is accompanied either by a form of subinfection by organisms in varying degrees of attenuation escaping from the intestine or by a form of intoxication.

What are the clinical results of all this? In the recognition of a certain type of patient whose ills are solely dependent upon intestinal stasis we shall all probably be in agreement. The victim of what we may call Lane's disease is now easily recognized and the symptoms are caused to disappear by appropriate surgical treatment. The symptoms are strikingly repeated in case after case. The patient is generally a woman of unhealthy aspect and attenuated figure. She is lean, cadaverous, flat-chested and she has a sour breath and cold and clammy hands. The skin is harsh and of an earthy color and bears many crops of pimples; its secretion is apt to be distressingly noticeable. She makes complaint of indigestion, pain after meals, flatulence and inveterate and incoercible constipation. The abdominal muscles lack bulk and tone. They are flabby and flaccid and all the viscera which they should hold up are fallen in greater or less degree. Mentally there is often a complete absence of the joy of life; the patient is a morose, querulous and often suspicious and introspective person. These attributes are rarely all present together but so many of them may coexist as to enable a distinct type of patient to be recognized. In the very obvious cases of this kind I do not think the mild measures that can often usefully be employed for the novice — massage, abdominal exercises and the unrestricted use of paraffin — are really of any value. These sufferers are properly cases for surgical treatment. The colon should be excised in whole or in part. In

some perhaps ileosigmoidostomy may be done but in every case with one exception in my own series there has been some regurgitation of the intestinal contents upward along the descending colon to the cæcum. The stasis then is worse than before for a mass of fecal material that is never wholly dislodged is palpable at all times. The symptoms which are nevertheless relieved in great measure are clearly not due merely to the stagnation of the bowel contents. No method of anastomosis nor any fashioning of new kinks can wholly prevent this backward flow though something can doubtless be done to lessen the tendency to it. Personally I believe that nothing short of colectomy offers a substantial chance of cure. How much of the colon is to be removed? This invites a consideration of the function of the large gut. It is well known that putrefaction goes on much more largely in the lower ileum than in the large intestine but it is not improbable that in the cæcum and ascending colon absorption takes place more freely. The liquid contents delivered through the ileocecal valve are moved backward and forward in the ascending colon and rapidly lose a good deal of the fluid matter. We drink with the large intestine. The ascending colon has possibly other uses of excretion or even of internal secretion. The hind gut which begins in some part of the transverse colon supplied from the anastomosis magna of Riolan is only for the storage and expulsion of the fecal masses full of bacteria mostly dead delivered to them. The part of the gut that needs removal is therefore I think the last part of the ileum, the cæcum and the ascending colon. Accordingly in such patients who need surgery I prefer to do Friedrich's operation of resection of these parts of the bowel.

It is on the whole an advantage to have the descending colon and the pelvic colon left. Absorption barely goes on at all from these parts for we know that a simple injection of saline fluid introduced into the rectum rapidly finds its way around to the cæcum. If the descending colon and the sigmoid flexure are too lengthy a suggestion of Mr Gray's may be adopted. Making

use of the principles of mobilization and displacement to which I called attention he loosens the hind gut from its moorings and displaces it upward so that what was the pelvic colon becomes now the descending colon and the latter is made to occupy the place of the transverse colon. This operation is simple very satisfactory in its results and in my hands has as yet had no mortality. Its advantages over complete removal of the colon appear to be that all the maleficent part of the intestinal tract is removed and that enough of the bowel remains to avoid the teasing and troublesome diarrhoea which is known to follow at times upon the larger operation. Moreover the number of raw stumps of ligatured vessels is fewer and their peritonization is far more complete than when all the colon is taken. Finally some of the omentum is left and in a territory given over at times to not the presence of the abdominal policeman is possibly a witness to peace. It is known that a great menace perhaps the greatest attaching to the operation of complete colectomy is the occurrence of obstruction afterward. The raw surfaces left by so great a denudation of the posterior abdominal wall and by the vessels which have been tied in the various mesenteries afford easy opportunity for tethering adhesions to form and cause obstruction. Friedrich's operation allows of very adequate peritonization of all the rough places left and closure of the gaps between the divided ends of the mesentery.

The patients whose condition and appearance I have just described very often undergo a most marvellous rejuvenation after operation. They gain in weight and glow with health life changes its color and vivid interest and keen enjoyment succeed to apathy and languor.

In dealing with the clinical aspects of intestinal stasis we are so far upon firm ground. We can pick no quarrel with the enthusiasts. What further part does intestinal stasis play as a causative factor in any disease? What influence has it for example upon the development of gastric and duodenal ulcer and upon the various phases of cholelithiasis?

Many surgeons have realized and some of us long have taught that in a great many cases these common disorders of the upper abdomen are not to be considered as isolated and primary diseases the view should rather be held that they are secondary expressions of a primary lesion elsewhere and that they are often linked together by a common antecedent if not evoked by a common cause. There is much evidence to show that they are secondary to some infection within or without the abdomen. For some years past I have held the view that the appendix is the test-tube in which organisms are propagated which by a process of subinfection express their ravages in the form of ulceration in the stomach or in the duodenum. A gall-stone as we know is merely an invading army of organisms coated by the mucus with which they have been bombarded. Sir Arbuthnot Lane believes that the chronic inflammation of the appendix itself is also secondary—the result of the causes which are associated also with stasis in the intestine. I regret that I cannot accept his view as tenable except in a small proportion of the cases. In the great majority we do not find intestinal stasis nor the Lane link or veil nor indeed any of the customary evidences of intestinal stasis to which he has called attention where as we do find the most positive evidence of appendicular disease. For the last few years when operating for a chronic gastric or duodenal ulcer or for gall stones, I have made in all proper cases a careful search at the site of the various obstructing membranes we now so easily recognize and I am compelled to assert that the evidence of stasis or of the demonstrable conditions upon which it so often depends is not to be found in more than a very small proportion of the cases. Moreover the recovery of the patient who for example has had gastro-enterostomy done for a duodenal ulcer is so speedy so complete and so enduring that it is a sheer impossibility that any lingering disease remains behind. We must put this matter definitely for recently I have heard of patients with declared duodenal ulcer who have lost their lives through operations directed to the relief not of the ulcer but of a wholly unpos-

tious intestinal stasis For gastric ulcer for duodenal ulcer and for cholelithiasis no operation should be sanctioned which does not deal directly with the parts involved To perform colectomy or ileosigmoidostomy in such cases is I think to exceed our right and to neglect our plain duty

So far as concerns a great variety of other diseases it is claimed that intestinal stasis is either the sole cause or a contributory cause of such significance that all other causes can be neglected or dismissed

In diseases of the joints for example rheumatoid arthritis or tuberculous disease stasis is held to be the essential indispensable factor causing the harm or at least permitting it to take place And the treatment of the severer forms at least of both diseases does not occupy itself with a direct assault upon the joints affected but with the intestine from which all the evil has started Cases are reported and are shown to us in which such treatment has had an effect beyond all one's wildest imagining I have myself seen many cases of advanced — indeed apparently hopeless — tuberculous disease of the hip-joint or of the wrist or shoulder in which an arrest of the quickly destructive processes took place almost at once when the colon was removed or a short-circuiting operation performed And a sensible improvement has followed also in a few cases of rheumatoid arthritis in which, while nothing was done directly to the joint the whole colon was excised Of the occurrence of such events there can be no question They do not, indeed stand alone Rheumatoid arthritis as we all know is a disease with many causes with many aspects with many vagaries and with many equal responses to many different forms of treatment We know little of the disease except that it is often possibly at times, the result of a chronic infective process at work somewhere in the body producing effects at a distance In the old days of surgery the earliest certain manifestation in pyæmia was the affection of distant joints Rheumatoid arthritis is pyæmia moving slowly Probably every surgeon knows something of chronic joint diseases which undergo striking improvement when factories of in-

fection are closed down. I have cured not a few cases of 'rheumatoid arthritis' by draining the gall bladder, which produced the poisons to which the joints reacted Of the occurrence of a few equal improvements after colectomy I am fully cognizant but I am also aware of many cases that have showed little or no permanent relief

Of tuberculous diseases of the joints the same may be said Without question there is some improvement in some cases much improvement or even cure in a few But the bulk of the cases so far as I can judge, are not appreciably affected by operation upon the intestine Moreover I have known of cases in which tuberculous disease of the hip developed after ileosigmoidostomy had been performed and it is at least of some interest to know that a patient upon whom colectomy was done fell a victim afterward to phthisis from which however recovery took place

The evidence at the moment available allows us certainly to say that intestinal stasis does seem to stand in a causal relationship toward some cases of chronic joint affections and that such cases exhibit a marked and instantaneous delay or even cessation in the destructive processes after operation upon the bowel and that a complete recovery of the joint ultimately occurs What is uncertain is not the existence of such cases but their frequency So little has been done in this direction, and so few surgeons have lent themselves to this form of treatment that we cannot do other than withhold a confident opinion The experience of the few however is worthy of a wider proof at the hands of other surgeons in carefully selected cases

But the enthusiasts ask us to travel with them even further than this. We are told that a very large number of diseases need have but little attention paid to their local outcry This should call attention, not to the seat of pain but to its cause which lies in the intestine To name a few of these diseases is to show the length to which we are invited to go Exophthalmic goiter trigeminal neuralgia various forms of functional and organic disease of the heart diseases of the breast, of the thyroid gland of the pelvic organs of the female and finally cancer

these are only a few of the diseases which are due it is said to stasis in the intestine. The claims are many the proofs few. We ask for evidence and if we know something of the work that has been done and of the really striking results that have already been achieved we shall be prepared to consider the evidence absurd though it may appear at first with an eager anxiety to do justice to new views.

In medicine the new idea is slow to gain currency. We are a conservative race and we all find criticism a more facile process than creation. Recent experiences in more than one branch of medicine will hardly persuade us to change our faith. Too much is claimed for every new advance. Vaccines were to rid us of many diseases now the removal of the colon is to check all diseases that it does

not cure outright. In the face of such exaggerated pretensions we do well perhaps to go warily but we must surely go with open minds. For there is no intellectual sin more deadly than sloth of the imagination. I have thought many hours read much and worked not a little at this subject of intestinal stasis, and have tried to clear my eyes for the new vision opened to us by Sir Arbuthnot Lane. My experience has been full of surprises old beliefs, so slow to perish have been undermined and new faiths so slowly fashioned have been painfully accepted. And now I do not hesitate to say that the whole question is one which will have to be considered by all of us and to be put to the proof. It cannot be dismissed with a shrug or a sneer for there is truth in the matter. Among much that is dross there lies a nugget of pure gold.

THE TREATMENT OF THE SECOND DEGREE OF PELVIC CONTRACTION

By HENRY JELLETT M.D. F.R.C.P.I. DUBLIN IRELAND

Master of the Rotunda Hospital

IN the second degree of pelvic contraction the true conjugate measures between two and three-fourths and three and one fourth inches in a flat pelvis or between three and three and one half inches in a generally contracted pelvis. In this degree it is usually only possible for a living child to be born through the vagina if either the size of the child is below the normal or the size of the pelvis is increased that is to say either premature labor must be induced or pubiotomy or symphysiotomy must be performed.

Accordingly four courses are possible. First the induction of premature labor in order to get a smaller child second the enlarging of the pelvis by pubiotomy or symphysiotomy at term third caesarean section at term and fourth craniotomy. It is unnecessary to refer to the last because I think modern obstetricians are practically universally agreed that perforation is only

permissible in the case of a dead child except under the most exceptional circumstances.

The different advantages and disadvantages of the three remaining lines of treatment are as follows. First comes the induction of premature labor. The advantages of this procedure in my opinion are not very numerous and consist principally in the fact that it is comparatively easily carried out and that it usually results in the birth of a living child. On the other hand the arguments against it are first that it is an operation in which it is extremely easy to infect the patient during the process of induction secondly that all methods of induction recommended up to the present are uncertain in their action and sometimes mean repeated manipulation and considerable delay and thirdly that the premature child is very liable to die in consequence of its feeble condition. I am sure there are many who will consider that I am underestimating the

advantages and overestimating the dangers of this procedure but still I am inclined to state as my deliberate opinion that the induction of premature labor in the second degree of pelvic contraction is not the treatment of choice although it sometimes may be the treatment of necessity.

The second possible line of treatment is cesarean section. In favor of this operation are a considerable number of points. In the first place it is very simple and easily carried out. If it is done early in labor or before labor has begun it is almost free from risk. There is no such thing as vaginal or perineal laceration; recovery is rapid; there are none of the pains and discomforts of a prolonged labor; and the foetal prognosis is usually entirely good. Lastly it can be performed in subsequent labors probably as often as is required provided no abdominal infection occurs. In fact so far as I can see it only possesses two disadvantages but these are serious. If we are to get all the benefits of cesarean section without the dangers it must be performed either before labor begins or early in the first stage and consequently it is not possible to give the patient an opportunity of delivering herself. The second disadvantage is the result of this namely that when once a cesarean section is done on a patient on account of contracted pelvis there is no logical reason why it should not have to be done in every subsequent pregnancy. In short one may say once a cesarean section always a cesarean section. This is a serious disadvantage because it is not always possible to measure a pelvis so very exactly as to be able to say that it falls positively into a certain degree and even if one can measure it so exactly one is not able to estimate correctly the actual size of the foetal head. Practical experience shows that in the second degree of pelvic contraction or in border line cases between the first and second degrees it may be entirely impossible to deliver through the vagina a living child at one labor whereas in the next labor with stronger uterine contractions and greater moulding of the head it is possible to effect delivery. If however a woman is to be delivered by cesarean section the operation must be done at

an early period of labor so losing all possibility of spontaneous or instrumental delivery.

The third possible line of treatment of these cases is pubiotomy. In favor of this operation are the facts that it is a smaller procedure than is cesarean section in a favorable case that its performance can be postponed till the last possible moment when a positive indication for delivery on behalf of either the mother or the child arises and that consequently every opportunity of spontaneous delivery or of delivery by the forceps is afforded and that it improves directly the prognosis of subsequent labors because it causes a permanent increase in the size of the pelvis. On the other hand the operation possesses certain disadvantages. In the first place the antecedent labor is prolonged and painful and during it the child may possibly die owing to compression even though it is most carefully watched. Further it is always liable to cause laceration of the vagina and possible injuries to surrounding parts and consequently in unfavorable cases it may prove to be a much more difficult operation than is cesarean section. One has therefore to consider carefully whether the possible risks of a pubiotomy are or are not counterbalanced by its advantages. I am of opinion that the advantages are considerably in excess of the disadvantages. First because the fact that the operation can be performed late in labor gives the patient every opportunity of escaping any operation and secondly on account of the extremely beneficial effect of pubiotomy on subsequent labors. To explain the reason for my belief it is necessary to place before you in a series of tables the statistics of the cases of pubiotomy which have been performed at the Rotunda Hospital both by my predecessor Dr Hastings Tweedy and myself.

Table I following gives a general statement of these cases.

The second table shows the nature of the different complications which occurred during the performance of pubiotomy or subsequently and from it will be seen that in four out of the nineteen cases there was what might be regarded as a serious complication. In

TABLE I

N	M	of Labor	Nature of Previous Labors	Pelvic Measure		Date	Operator	Result		Weight of Child lb.	Nature of Subsequent Labors
				C. V. Cm.	T. Cm.			Mother	Child		
F. L.	I			6 5		Nov 906	Dr. Tweedy	A	A	7 1/2	II Cesarean III Extraperitoneal cesarean section IV alive 5 1/2 lbs., November 1906 V Classical cesarean section alive VI July 19 VII Classical cesarean section alive April 1904
C. S.	V	I Breech dead II Miscarriage III Breech alive but dead		7 5		Mar 907	Dr. Tweedy	A	D	6 1/2	VI Spontaneous live, 8 1/2 lbs. VII Spontaneous alive 11 lbs. X Spontaneous impacted breech alive very large March 4
B. G.	IV	Abd. difficult forceps version at		8	5	May 907	D. Tweedy	A	A	8 1/2	
E. B.	I			8 1/2	5 1/2	May 907	Dr. Tweedy	A	A	7 1/2	II Spontaneous alive 11 1/2 lbs. May 1907
S. S. F.	IV	I Forceps dead II Induction 33rd week III Induction 36th week IV version, dead 37 1/2 lbs.		8	5	May 907	Dr. Tweedy	A	A		
G. M. D.	III	I Symphysectomy dead II Abortum		8	5	Sept 10	Dr. Tweedy	A	A	6 1/2	
H. N.	I			8 1/2		Nov 909	Dr. Tweedy	A	A	8	II Spontaneous alive 8 1/2 lbs. July
M. O. T.	IV	Forceps children still born				Oct	D. Tweedy	A	A	7 1/2	I Transverse podalic version dead 6 1/2 lbs. Jan. 1913
M. C.	III	Perforation		8	5	Nov	D. Tweedy	A	A	7	IV Spontaneous breech alive 8 1/2 lbs. March
M. K.	II					Nov	D. Jellett	A	A	6 1/2	
M. B.	IV	I Forceps alive II Normal alive III Normal alive		7		May	D. Jellett	A	A	6 1/2	I Forceps live June
K. B.	I					Mar	D. Jellett	A	A	6 1/2	II Placenta previa hydramnios, uterine version dead 6 1/2 lbs. March
M. W.	II					Jan 91	Dr. Jellett	A	A		
C. O. C.	I			8	9	Aug 91	Dr. Jellett	A	A		II Spontaneous live 8 lbs. Feb
M. R.	III			8		Aug	Dr. Jellett	A	A	8 1/2	
R. M.	II	I Spontaneous previous alive		8 1/2		Aug 91	Dr. J. Bet	A	A	8	
R. C.	IV	I Forceps alive II Breech version III Breech forceps live hour				Aug 91	Dr. Jelle	A	A		
M. G.	IV	I Forceps live II Spontaneous dead III Forceps dead				Nov	Dr. Jellett	A	A	5	
M. C.	V	I Forceps live II Forceps live III Cesarean IV Cesarean		8	5	Apr	D. Jellett	A	A		

A dead at minutes. Hydrocephalus and spina bifida

all of them however the ultimate recovery was perfectly satisfactory The tear of the bladder wall was sutured at the time and healed completely The patient in whom crural phlegmasia occurred was quite well when she left the hospital The two cases in which necrosis of bone occurred require some explanation The piece of bone which necrosed was the piece lying between the saw-cut and the symphysis and in both these cases this piece came completely away It is interesting and important to note that in neither case was there any interference with the patient's power of locomotion subsequently and I consider that they clearly demonstrate that failure of union of the bone at the site of incision in no way interferes with locomotion

The third and fourth tables show the difference between labors which occurred previous to the performance of pubiotomy and labors which occurred subsequent to pubiotomy These statistics are most important and deserve careful study It will be seen from them that whereas in twenty-nine labors previous to pubiotomy only three children were delivered alive spontaneously subsequent to pubiotomy out of fifteen labors eight children were delivered alive spontaneously The three cesarean sections performed after pubiotomy were all done in the same patient and from the first table one sees that in this case pubiotomy had been done in a patient whose conjugate diameter was less than that recognized as the normal minimum for pubiotomy namely 7 cms

In conclusion I would like to offer my opinions as to the treatment of the second degree of pelvic contraction

1 Pubiotomy is the operation of choice unless there are special circumstances in the case or special complications present

2 Pubiotomy is especially indicated in the young multipara because of the effect of the operation on subsequent pregnancies and because owing to previous labor the vaginal canal is dilated and lacerations are unlikely to occur

TABLE II
COMPLICATIONS OF PUBIOTOMY

	Cases
Tear of bladder wall	1
Necrosis of bone	1
Necrosis of bone and external hemorrhage	1
Anal hematoma and crural phlegmasia	1
Internal hemorrhage from vulvar veins	5
Uncomplicated	10
Total number of cases	19

TABLE III
NATURE OF PREVIOUS LABORS

Nature of Labor	Number	Result of Child	
		Alive	Dead
Spontaneous	7	3	4
Induction	2	1	1
Forceps		3	8
Version	1		
Symphiotomy			
Craniotomy	4		4
Difficult unassisted	3		3
Total	29	7	2

TABLE IV
NATURE OF SUBSEQUENT LABORS

Nature of Labor	Number	Result of Child	
		Alive	Dead
Vaginal Delivery			
Spontaneous	8	8	
Forceps			
Version			
Craniotomy			
Cesarean section	3	3	
Total	5	12	

On transverse presentation and on placenta previa

3 On the other hand cesarean section is more suitable in the elderly primipara because vaginal laceration is more likely to occur and because it is unnecessary in her to take account of future pregnancies

4 Premature labor is only indicated under special conditions which render either of the foregoing operations impossible or inadmissible

5 Craniotomy is only permissible when the child is dead

FURTHER EXPERIENCE WITH RESECTION OF THE OESOPHAGUS FOR CARCINOMA*

By WILLY MEYER, M.D. *et al.*
 A. and ng Surgeon in Genl I Post (June 11 1912)

In accordance with the suggestion previously made¹ that every case of resection of the oesophagus for carcinoma be the outcome favorable or unfavorable should be published by the surgeon performing the resection a second series of such operations is herewith reported.

The case histories will be briefly and chronologically related and comments added.

CASE 5. Infiltrating carcinoma of lower half of intrathoracic oesophagus including the portion behind the aortic arch. First stage: a gastrotomy and inferior oesophagoplasty making use of the major curvature of the stomach (Beck-Jianu). Second stage: thoracotomy, tumor has perforated through the oesophageal wall posteriorly infiltrating mediastinum transposition of proximal stump antethoracically under skin drainage. Death eleven hours after operation.

Woman 44 years. Increasing signs of oesophagus. Disturbance for nine months no solid food taken for last six months. Sound locates upper and fisture 9 1/2 inches (24 cm.) behind the acromion. X-ray findings: narrowed portion evidently several inches long.

December 27, 1912. Gastrotomy and inferior oesophagoplasty with needle and thread (Beck-Jianu)—first case thus operated upon by author.

Parenthetically I wish to state here that the operation proposed by Jianu in 1912 was done first in 1905 and tested out on animals by Carl Beck of Chicago assisted by Alexis Carrel. A report of the experiments was published in detail in the transactions of the Chicago Medical Society. Jianu was evidently not aware of the American work done seven years before his own.

The new tube was placed below the pleural muscles according to Roepke's advice. It loughed at the distal end the silkworm sutures which were to hold the tube in place having been

placed through the skin and the cutaneous thickness of the new tube whereas only the mucosa should have been sutured. There was partial necrosis at the distal end with subsequent suppuration which spread to the rib-cartilages and sternum greatly complicating the after-treatment, retarding convalescence and temporarily blocking further operative procedures. Regular feeding was given through a large tube which was changed time after time for the purpose. The patient was given the ordinary solid food which he masticated thoroughly and deposited in some warm fluid before it was gently pressed down into the stomach by means of a large funnel syringe.

At the special request of the patient extirpation of the tumor was attempted. If this proved impossible it was planned to do a palliative operation involving the oesophagus above the tumor closing its distal end and transposing the proximal portion to the thoracically. Thoracotomy was performed May 22 under intratracheal sufflation (Dr. Eggers). Fore skin incision in seventh interspace. Four ribs were divided somewhat to the outside of rib angle good access. Infiltrating tumor extending from about one and one-half inches above cardia to a place fully one inch above the aortic arch. Many glands. Costal pleura incised and glands pushed off with gauze on handle tumor exposed. As the left pneumogastric nerve can still be prepared off the tumor radical operation is decided on. The right pneumogastric totally involved used. Mobilization of aortic arch by double ligature and division of intercostal arteries thoroughly loosening out the pleura all around. On holding and retracting aorta with Langenbeck's hook sudden irregularity of heart profound shock. Trendelenburg's posture. Preliminary sponges and tampons removed. Sufflation under high pressure intravenous line. Equilibrium gradually restored and operation continued. Very careful handling of aortic arch with fingers. It is seen that right behind the tumor has perforated the oesophagus and widely infiltrates posterior mediastinum. While examining local conditions the tumor was torn. Now operation could not be interrupted but must needs be completed. Oesophagus stump surrounded with gauze and divided division of tube above cardia. Two end-to-silk ligatures dividing it with cautery. In this method it is as usual. Following the double ligature and division of oesophagus above upper end of tumor which fishes removal of the tumor. With patient turned on back proximal stump is now brought out of typical neck incision.

*Some of the cases were reported at the surgery on human organs, 1911, July.

For first series cases 1-4 see Surg. Assoc. & Ob-Gyn.

Ann. Surg. Phila. 9, 3 September 1912.

Ann. Surg. Phila. 1.

Deutsche Zeitschrift f. Chir. 3.

Illinois M. J. 1905.

Zentralblatt f. Chir. 28, 28.

J. Am. M. Ass. May.

Read before the association at meeting of the American Gastro-Enterological Association, New York City, June 4.

at inner border of sternocleidomastoid muscle above clavicle and is transposed downward under skin bridge in direction of Beck Janu's tube-opening. Drainage of pleural cavity through ninth intercostal space. Complete closure of thoracic incision by layer sutures differential pressure (positive)—after treatment at short intervals periods of rhythmic changes of pressure producing variations of lung inflation equivalent to artificial respiration. In course of next few hours temperature rising patient succumbs eleven hours after completion of operation. Post mortem not allowed.

CASE 6 Cancer of oesophagus behind aortic arch. First stage gastrostomy and inferior oesophagoplasty (Beck Janu) under venous anaesthesia. Hilt's wire-stitching instrument used. Second stage thoracotomy. Tumor found in operable palliative operation no drainage sudden exitus eight hours after completion of operation.

Man 68 years typical increasing symptoms of oesophageal stenosis for last six months. Presence of tumor behind and somewhat below aortic arch proved by all the modern methods of diagnosis. March 24 1913 gastrostomy and lower oesophagoplasty (Beck Janu) with the help of Hilt's wire-stitching instrument. Under venous ether anaesthesia patient is deeply narcotised in very short time. Median incision omentum major adherent to anterior wall of stomach and liver most likely due to former ulcerations. Beck Janu tube can be nicely and quickly formed by use of both the large and small wire-stitching instruments. Assistant's blunt retractor injures liver making an ugly tear. It is packed with gauze and tampon brought out of abdomen through special stab wound. Uninterrupted smooth surgical recovery but severe typical ether pneumonia sets in rendering patient's condition critical for quite some time. Feeding with ordinary well masticated food as in foregoing case. The gastrostomy opening is kept plugged with gauze between meals. Oil and on some regurgitation of stomach contents. Surrounding skin well protected in order to prevent eczema gains a few pounds in weight. In view of the long duration of the disease the patient insists on performance of second stage of radical operation though made fully aware of its seriousness. June 3 Morphine atropine hypodermically pre-operative subcutaneous instillation of saline 800 ccm. Irrigation of stomach tube removed opening plugged. Intratracheal insufflation (Dr Jagers). Fore's intercosto-dorsal incision in eighth interspace eighth to fifth ribs divided at angle. Intercostal vessels surrounded by catgut ligature centrally before they are cut. Splendid exposure mobilization of aortic arch whereupon it is seen that the tumor covers two to three inches of the oesophagus and forms a unit with posterior wall of aortic arch and bronchus both pneumogastric nerves involved extirpation impossible. Palliative operation by Hilt's oesophagus well

above upper end of tumor viz about two and one half to three inches above aortic arch inverting distal stump and transposing proximal through neck wound and under skin bridge in front of thorax. Ligature occluding proximal stump remains uncut. Neck wound closed without drainage also entire chest wound after bed of oesophagus and distal stump have been touched with 50 per cent tincture of iodine. Pulse at completion of operation 120 color of face satisfactory returned to ward. Seven hours later sudden exitus.

Wound inspection. Neck wound puffed by sero-sanguinolent fluid and some air. On reopening chest lungs appear well distended only small amount of fluid in posterior mediastinum.

Comment. These two cases 5 and 6 were found beyond surgical help. However to develop this fact it was necessary to open the thorax. They prove the uselessness of attempting radical removal of an infiltrating cancer from behind the aortic arch if the cancer covers several inches of the tube and according to the history of the case has been growing for a number of months. Where such conditions prevail only a palliative operation consisting in antethoracic transposition of the proximal stump should be performed the tumor itself being left intact. If the patient's general condition does not warrant such major though only palliative work the operation remains an exploration.

CASE 7 Epithelioma of oesophagus between aortic arch and cardiac. First stage gastrostomy second stage thoracotomy division of oesophagus below stricture inversion of distal stump. Ant thoracic transposition of proximal stump with tumor *in situ*. At first good recovery. Death on seventh day after operation from septic pleuritic effusion.

Man 68 years increasing difficulty in deglutition for last four to six months. Has lost greatly in weight. Chronic bronchitis. Bougie finds stricture 13½ inches (34 cm.) behind incisor teeth. Only fluids pass. January 22 1914 Kader's gastrostomy as patient seems too emaciated and weak to stand the Beck Janu operation. Large tube inserted soon forced artificial feeding with full diet thoroughly masticated by patient and introduced with large hand syringe. After some time able to swallow again well-chewed solid food. Nevertheless continuous loss of weight. February 25 oesophagoscopy two pieces removed for microscopical examination (Dr Lankauer). Pathologic diagnosis Squamous-celled epithelioma (Dr Humphreys). March 12 Thoracic operation. Hypodermic of one-quarter gr morphine plus

1300 gr atropine one hour before stomach irrigated tube removed gastric fistula plugged and protected. Intratracheal insufflation (Drs Eggers and Sanford). Torek's incision in eighth intercostal four ribs upward divided between their angle and spine with Cigli's saw works nicely. Lung not adherent posteriorly abdominal spreader found best in holding thoracic wound apart. Localized tumor palpable about two inches below aortic arch left vagus not involved right tightly adherent has to be cut both cocaineized with 1 per cent novocaine solution by intra and petineal application loosening of esophagus to about one inch above cardia can be well done lifted up on twisted gauze double silk ligature tied twice sufficiently far below tumor division with electric cautery careful cauterization of stump after separation lower stump caught with bryonet clamp as close to cardia as possible prising of purse string suture with round needle and chromicized gut taking hold of loops by pulling latter well apart. Evagination easy four securing top sutures also with chromicized gut. Distal stump dropped disappears in the depth. Then proximal stump gradually loosened it is tightly adherent right lung behind aortic arch a number of ligatures are required during which manipulation the right pleural cavity is opened. In order to reach esophagus above aortic arch the fourth rib also needs division. Lower esophagus loosened and with gauze strip passed underneath lifted well up. In order to loosen it all around quite a number of ligatures behind aortic arch are required vessels to be ligated can however be pulled into view without mobilizing arch. Then stump of esophagus placed in front of arch and loosened in the mediastinum upward. Following this typical neck incision esophagus hooked with forefinger and stump pulled out it responds with a jerk wrapped in moist warm gauze. As lungs can be nicely inflated and the whole operation has been done with perfect asepsis drainage of the pleural sac is not carried out as planned but airtight closure of thoracic cavity decided on and done as always insisted on by Sauerbruch and seemingly affirmed by Torek's experience with his successful case. Closure of neck wound with interrupted silkworm then length of healthy portion of upper stump measured on thorax transverse incision of skin formation of subcutaneous tunnel transposition of tube antethoracically with tumor still in place ligature around esophagus fully one half inch above upper border of tumor clamp distally division with cautery between end of stump corresponds to second intercostal space. Corners of the transverse wound closed with silkworm and muscular coat of esophagus attached to skin by means of a few interrupted mattress sutures of catgut. Gauze dressing kept in place by adhesive plaster avoiding pressure. Typical Desault dressing fixates arm.

Operation as such lasted two hours and fifty five minutes with suture and dressing three hours

and ten minutes. Pulse at completion of patient awakes on operating table brought to bed cyanosis 9 P.M., pulse 84 gastric tube replaced March 11 A.M. in good condition P.M. sudden rise of temperature to 102.2 diffuse bronchitis March 12 good condition 8 P.M. first change of dressing in order to open esophageal stump no gurgitation of saliva was feared which might cause a paration during sleep primary healing of chest wound projecting esophageal stump necrotic some swelling over tunnel of skin posterior wound is not disturbed. March 13 Condition clinically satisfactory temperature and pulse lower. March 16 A.M. returned to ward P.M. first change of position part of dressing fourth day after operation a few necrotic spots in course of suture line dullness over left lower chest which however in view of the favorable clinical symptoms is not considered due to presence of a fociated fluid. Kidneys work all right some cough and mucous expectoration. March 18 second change of dressing dullness of same extension tapped sero sanguinolent fluid of foul odor found immediate opening of lower outer angle of chest wound where subcutaneous swelling had appeared pleural cavity entered by pushing dressing forceps forward about one and one half pint of same fluid evacuated two drains dressing when returned to bed cyanosis of lips which had been slightly present before increased respiration more rapid. Patient returned under differential pressure in negative chamber frequent rhythmic changes of pressure in chamber for artificial respiration hypodermic stimulation etc. Midnight condition good pulse 90 rectal temperature 99.8° respiration 20 March 19 A.M. condition satisfactory differential pressure topped to find out effect of ordinary breathing little difference pulse soft. No urine passed bladder hold only a few drops. 4.30 P.M. sudden exitus.

Wound in pectus. Entire lower pleural cavity closed. Posterior mediastinum, shows gray black color (infection). Tapped fluid had by this time grown streptococci and staphylococci lower esophagus stump had remained closed no fluid in right pleural cavity esophageal stump below neck wound five and one half inches (14 cm) long of this length lower end of four inches (10 cm) crotic dividing line living and necrotic esophagus corresponds to clavicle organ here probably killed and pressed upon by bone patient was very emaciated but no fat whatever in any bones.

Case 8. Cancer of esophagus stricture just behind aortic arch. First stage gastrostomy and esophagoplasty (Beck-Jana). Second stage thoracotomy resection of tumor tumor.

Man well preserved 50 years of age trouble in swallowing for last six months only solids pass. Stereoscopic X-ray shows tight stricture corresponding to body of fourth dorsal vertebra. Sound finds obstruction 28 cm behind incisor teeth April 10 1914 gastrostomy and first esophagoplasty (Beck-Jana). Stomach small cannot be pulled

forward satisfactorily. In trying to bring it well in front of the abdominal incision one of the vessels running perpendicularly on to the stomach from the left epiploic artery tears and two bleeding points have to be ligated. Then major curvature exposed as usual and divided in horizontal direction with Hiltl's wire stitching instrument for inferior oesophagoplasty (see above). Care is taken to make the communication of the tube with the cardiac end of the stomach as small as possible: a transverse superficial incision of the gastric wall is made in front of the base of the tube with the Paquelin cautery anteriorly and posteriorly and two mattress sutures one on top of the other are placed to further reduce the communication. Completion of operation as usual. Gastrostomy opening corresponds to third costal cartilage.¹

There is no regurgitation from the stomach (This procedure advocated by me some time ago² seems to guard satisfactorily against the peristaltic wave which ordinarily would run from the cardia to the pylorus³). Soon a large-sized tube is regularly introduced into the new canal and the food after being well chewed and then deposited in warm fluid is pressed into the stomach by means of a large hand syringe. Patient slowly gaining weight, urgently desires second stage. Therefore on June 16 thoracotomy and resection of the tumor. By podermoclysis of 600 ccm of Ringer's solution hypodermic of morphine one sixth of a gr plus atropine 1/100. After thorough irrigation gastrostomy tube removed and wound plugged and covered with adhesive plaster. Intratracheal insufflation (Dr Feggers) introduction of tracheal tube distal patient coughs up quite some blood through the same before operation starts. Tork's incision left eighth intercostal ribs divided between angle and spine, with Fifth up to fourth included intercostal vessels tied as usual splendid access with abdominal preder. Lung not adherent. After opening posterior mediastinum infiltrating tumor found right behind aortic arch right pneumogastric nerve can be well pushed off which is cause of decision in favor of radical operation. No cannulation of nerves on account of the proximity of the aortic arch. Latter has to be mobilized intercostal arteries involved in tumor profuse hemorrhage from two which tear but fortunately can be tied. Tumor has to be loosened bluntly from beneath arch very extensive adhesions all around and apparently also to right pleura which had been opened between arch and diaphragm early in the operation. The posterior adhesions are exceedingly firm so much so that the advisability of continuing the operation appears questionable. I will more

rapid and weaker. Increased air pressure. After some interruption work continued. Suddenly pronounced venous hemorrhage away down in the depth evidently from a tear in the vena azygos or one of its branches close to the trunk. Gauze tamponade. Now circumcission of oesophagus in middle between aortic arch and diaphragm muscular coat pushed back fascia tied chromicized purse string suture laid a second circular ligature of oesophagus about one inch above division with cautery inversion of lower stump nicely feasible. Two Cushing top sutures stump dropped back. It disappears in the depth. Proximal stump is brought before aortic arch loosening in upper vault patient turned on side typical neck incision proximal stump pulled out temporarily wrapped in moist gauze. Incision in tenth intercostal for drainage closure of chest wound amputation of oesophageal tumor below ligature stump pulled underneath skin bridge and fastened suture of neck wound dressing. During latter part of operation pulse has become imperceptible at wrist in spite of artificial respiration with increased pressure. Tube removed from trachea no spontaneous respiration. Artificial respiration applied by means of plus pressure apparatus but patient has already passed away.

Although in the following case of intended resection of the oesophagus the patient died before resection was attempted at the second stage of the operation and the case should therefore not be recorded here the observations made in the course of the operation nevertheless entitle it to brief mention. It is not counted among the resections.

Carcinoma of oesophagus behind aortic arch gastrostomy, thoracotomy first stage of resection as planned at that time viz division of oesophagus above cardia double inversion of either end. Recovery from operation. During interval eversion of inverted proximal stump perforation of tumor into bronchus pneumonia death.

Man 65 years old increasing difficulty in swallowing for last eight months. September 1912 admission to German Hospital gastrostomy (hader) by Dr Tork who very courteously referred the patient to me for further operating. November 6 at the time of the third Clinical Congress of Surgeons of North America thoracotomy in negative chamber in the presence of a number of invited guests. In view of the patient's precarious condition the plan was to do a two stage operation. Stage 1 to consist in thoracotomy thorough scanning of the local conditions dividing of the oesophagus below the tumor closing of either end by double inversion and strengthening of the proximal end if possible by a fascia transplant. Stage 2 second thoracotomy completion of resection.

When forming the tube I noticed it found to be as her blue color in consequence of the accidental tearing of necessary ligature of the vessels. During the operation number of small fatal developments, most likely as result of the interference with the circulation of the blood. How long survival was to be in hand in the stomach is the course of this operation.

Zentralblatt f. Chir. 1914, No. 4.
Springer, EE. 1914. f. peristaltic or Esophagitis 2.
Deutsche Zeitsch. f. Chir. 1914, No. 10.

Operation Incision in eighth intercostal space lung adherent to diaphragm œsophagus exposed tumor well palpable behind aortic arch and tracheal bifurcation pneumogastrics gently separated and coagulated by placing on them a tampon saturated with a 10 per cent cocaine solution double ligation of œsophagus about two inches above cardia with stout silk division between the ligatures with cautery inversion of distal stump according to method worked out experimentally¹ This was rather difficult on account of the great depth of the operating field stump reappears on withdrawing forceps a few Cushing top sutures placed Work on proximal stump technically easier double purse string and inversion fascia transplantation not added in order to save time closure of thoracic wound after free incision in tenth intercostal space for drainage of pleural cavity cigarette drain with central rubber drainage tube for bed of œsophagus introduced plus split rubber tube on either side zinc ointment rubber dam dressing Patient stood operation nicely is retained for twenty hours under differential pressure (positive cabinet) in a slight Trendelenburg posture Free serosanguinolent discharge in dressing By keeping the patient under differential pressure from the start after the completion of the operative work this invariably infected effusion is actually pressed out of the pleural cavity by the continuously inflated lung through the drainage hole No special rise of temperature patient kept in observation room of thoracic department November 8 forty hours after operation first change of dressing in chamber cigarette drain removed has odor of œsophageal secretion new dressing with zinc ointment and rubber dam over drainage incision returned to ward with normal pulse and temperature November 21 fifth day after operation second change of dressing drainage again plentiful primary union of intercostal incision patient out of bed November 26 regular dressings continued patient gaining regular feeding through gastric fistula November 30 on the fourteenth day after operation ward nurse reports that dressing became unusually wet during night and on changing it a closed silk ligature was found on the gauze milk swallowed by mouth soon appears in drainage opening Evidently doubly inverted proximal stump has become everted its closing ligature having cut through Forced feeding through gastric fistula daily dressings On seventeenth day after operation fever set in cough increased expectoration of foul odor distinct signs of pneumonia Exitus three days later on twentieth day after operation Ward inspection shows perforation of the carcinoma into the left bronchus and pneumonia of the left lower lobe distal end of œsophagus firmly closed proximal open everted imbedded in dense scar tissue

Comment The case nicely demonstrates how smoothly even such reduced patients

Reid.

can recover from an œsophageal operation if free drainage of the pleural cavity is used for after treatment Had the fascia graft been put on the proximal stump as contemplated the eversion might perhaps have been prevented Animal experimentation has shown the air and water tight attachment of the graft to the proximal stump after twenty four hours But this could not have prevented the fatal issue The patient certainly did not die as a result of the œsophageal communication with the pleural cavity but in consequence of the perforation of the tumor into the bronchial tree The case further shows that in these advanced cases a two-stage operation should not be recommended The one-stage operation should be risked but planned in such a way that it can be broken off at any point and be finished as a palliative or exploratory operation

The above histories of cases illustrate the progress that is being made in this chapter of operative surgery They show some of the causes of the accidents that so far with very few exceptions have marred our results, and enable us by the lessons they teach to guard against their recurrence We are no longer groping in the dark as to the best mode of procedure and after treatment in this class of cases A typical operative method has been evolved which is bound to show improved results provided only the patients do not come too late

The improvement in results should be immediate if careful attention is given to the following points

- 1 The selection of cases for radical operation
- 2 The removal of the proximal stump of the œsophagus from the posterior mediastinum and transposition of the same under the skin of the thorax anteriorly and downward
- 3 Free drainage of the pleural cavity immediately following operation in each and every one of the cases

Comment ad 1 Selection of cases for radical operation

We have been sufficiently conservative in the selection of cases for exploration but in

proceeding from exploratory to radical work we have still to learn to be as conservative in thoracic operations as we are in abdominal work.

It is not difficult to understand how the surgeon may be led to be too aggressive after he has once gained entrance to the thoracic cavity. He has done gastrotomy a short time before possibly connected with inferior oesophagoplasty according to the Beck-Jianu method. He is now anxious to really help the patient and not merely do a palliative operation although even this would fulfill the most fervent desire of his patient namely to regain his ability to swallow. The surgeon is particularly anxious to help this class of patients as they of all who come under his daily care complain least are patient and courageous and give evidence of unbounded often truly pathetic confidence in his ability to help them. It is hard then after all the preparations and preliminary work to desist and leave the patient to his fate. Yet this should be done more frequently than has been done heretofore. Why should the surgeon act differently in the thoracic than in the abdominal cavity? He would not dream of attacking radically a carcinoma of the pylorus which has encroached upon the pancreas and transverse colon and become firmly attached to the liver. He would either promptly close the abdomen or in the presence of pyloric obstruction mercifully put in a Murphy button for gastro-enterostomy. And here in the thorax when dealing with firmly adherent tumors behind the aortic arch at the very Achilles-tendon of life we have forgotten that there is a limit to surgery. We have moved and removed these tumors when they had infiltrated the oesophagus for three to four inches and more we have freed them from the surrounding important tissues and organs: pleura, aorta, pneumogastric nerves and bronchus with knife or scissors or bluntly—more often the latter—and then we have been surprised and deeply shocked and disappointed to find when artificial respiration was discontinued at the completion of the work that the patient had passed away. We have overrated the endurance of our patients in their enfeebled

condition. We had no experience to guide us in gauging their power of resistance. But now that we have gained that experience it is time that a halt be called to radical operation in these far advanced cases in order that excessive mortality may not further check the proper development of the surgery of carcinoma of the oesophagus.

I should not like to create the impression that we had attempted to extirpate these tumors indiscriminately that we have operated upon every carcinoma of the oesophagus that has come under our care. Far from it we have made as careful a selection prior to operation as we knew how. The cases in which we did thoracotomy gave well grounded hopes judging from the clinical symptoms that a radical operation might be successfully done. We erred in not promptly breaking off the operation when conditions revealed during operation showed the case too far advanced for radical work.

In the light of the experience had in my cases I have now made it a rule not to attempt radical work in large infiltrating tumors of the oesophagus that have grown up from below and behind the aortic arch or have developed directly behind it.

They are inoperable or rather for the present I consider them such. Possibly the future will yet teach us how to deal even with these advanced growths. Maybe we shall learn how to expose freely one or both of the pneumogastric nerves—but gently and sharply never bluntly!—after mobilization of the aortic arch and properly worked-out cocamization of the nerves and then work successfully also in this dangerous locality. But for the present it seems wiser to concentrate our energy upon and save the strength and power of endurance of surgeon assistants and nurses for the cases that bid fair to respond to our efforts.

If I look at the histories of the eight reported cases of radical excision of a cancerous oesophageal growth from this standpoint I find but two in which resection was indicated the remaining six in all of which the far advanced tumor was situated partly or entirely behind the aortic arch should have been considered beyond radical operation.

In the two operable cases—one a man 66 the other one 68 years of age—the operation as such was well borne. One died at the end of the first day the other one seven days after the operation. In both the thorax was closed without drainage but for which I believe the latter at least might have lived inasmuch as in both the rapidly appearing infected serosanguinolent exudate was the immediate cause of death. In both the tumor was found between aortic arch and cardia one of the pneumogastric nerves could be saved in each case the tube could be easily loosened upward from behind and above the aortic arch.

Summing up I would say that my experience leads me to advocate radical operation in any part of the œsophagus upon small circumscribed new growths—usually the rather benign squamous-celled epithelioma—and upon infiltrating carcinomas excepting of the latter only those situated behind the aortic arch.

Here again comes to view the importance of early diagnosis followed by prompt operative intervention. But in order that profession and laity may have the necessary confidence to seek early relief the operative results will have to be improved. The chief factor in accomplishing this must be greater conservatism during operation that is a more frequent desisting from radical work.

Comment ad 2. Removal of the proximal stump of the œsophagus from the posterior mediastinum and transposition of the same under the skin of the thorax anteriorly and downward.

Because of the anterior situation of the gastrostomy opening also when employing the method of Beck Jianu it appears wiser to loosen the proximal stump in its bed and transpose it *in toto* antethoracically.¹

Further practical experience in man must prove how long this transposed proximal stump may be without becoming necrosed. The peculiar blood supply of the œsophagus may well suffice to keep a longer tube alive in spite of the severance of its nourishing vessels within its bed. In addition to incomplete blood supply pressure

of the clavicle from below as demonstrated in my case No. 7 may be a further factor in producing partial gangrene of the more distal portion of the œsophagus in its new position particularly in emaciated patients. Special attention therefore should be directed (1) to making the subcutaneous skin tunnel as wide as possible avoiding constriction (2) not to put the stump on the stretch (3) in case of need to make a free fat transplantation into the supraclavicular space to lift the tube and therewith avoid its being kinked at the level of the bone or (4) to chisel a sufficiently deep groove into the bone to receive the tube.

Zaajer of Leiden in his case of successful resection of the cancerous cardia and lower end of the œsophagus brought the proximal stump out into the intercostal space laterally thus allowing the œsophagus as such to remain *in situ*. But it seems better to have the opening of the proximal stump in front of the thorax, in line with the gastrostomy opening which is always placed anteriorly.

With œsophagoplasty in view the Beck Jianu operation is certainly the ideal procedure of performing gastrostomy because it combines the establishment of a gastric fistula with the formation of a new œsophagus in its lower half if not its lower two-thirds inferior œsophagoplasty.

The Beck Jianu operation is still on trial. To make it the operation of choice, a number of important points regarding it require further investigation. I would mention only (1) the persistence of the peristaltic wave in the new tube viz from the cardia upward to the new gastrostomy opening which latter usually corresponds to the level of the left third or even second rib (2) the likelihood of the interference of the gastric secretion discharging from the tube-opening with plastic skin work that may become necessary for the completing of the new antethoracic œsophagus.

In order to avoid the upward peristalsis in the Beck Jianu tube I have proposed

(a) A transverse superficial cauterization with the Paquelin anteriorly and posteriorly in front of the base of the tube to destroy

the nerve supply. It remains to be seen whether this will do harm with reference to the nutrition of the tube.

(b) To make the communicating opening of the tube with the cardiac portion of the stomach as small as possible by converging the incision toward the major curvature.

(c) To place after completion of the second row of suture a widely approximating additional mattress suture at the spot if need vary in double layer.

(d) To make a slight twist of the tube according to Cerny's method.

Recently I had opportunity to test *a*, *b* and *c* in three cases and the functional result was most satisfactory.

Personally I have done the Beck-Jianu operation six times without losing a patient. It certainly is a very fascinating procedure but is justified only—be this emphasized once more with reference to a possible future anterior transposition of the oral stump of the oesophagus—this being the superior

and the Beck-Jianu operation the inferior partial oesophagoplasty—after resection of the intrathoracic tumor. Other was the watertight gastric fistula resulting from the older and simpler method of Witzel-Kader and Senn are decidedly preferable.

In five of the six cases Hohl's wire stitching instrument was used for the first row of suture with great satisfaction. It rendered the operation absolutely dry and swift and shortened its duration. It would be gratifying if in American instrument

of similar type were constructed in the near future. Of course the surgeon should not rely on the use of this instrument only; he should practice the operation also with needle and thread and two clamps of equal size their curve corresponding to that of the major curvature.

For sowing material chromicized gut will most likely be the best at least for the second (outside) row of continuous suture in view of any possible suppuration at either end of the subcutaneous tunnel. In my first case of this kind (see above No. 5) the continuous silk suture gave us a good deal of trouble on account of the submuscular suppuration.

Ach¹ and Rehn Jr.² have of late practiced resection of the oesophageal tumor by way of the posterior mediastinum thus avoiding entrance into the pleural cavity. It is to be hoped that both will continue this work so that comparisons may be made between the results obtained with their method of advance and the transpleural resection with subsequent drainage as practiced by us.

Comment ad 3. The necessity of drainage of the thoracic cavity after each and every case of oesophageal operation.

I had come to this conclusion by adverse experience two years ago when I had hermetically closed the chest in one of my cases of resection and lost the patient in consequence of a rapidly appearing pleural exudate. The observation of Forch's beautiful case of successful resection of the thoracic portion of the oesophagus without drainage of the pleural cavity made me waver. It seemed to confirm Sauerbruch's procedure who in my view closed the thorax airtight (Technik der Thoraxchirurgie 1911). However my experience has convinced me that Forch has here been favored by a remarkable amount of luck. Had I drained the pleural cavity in my patient (Case 1) the Cerny-Hospital of New York would now most likely have to it credit to recover after resection of the oesophagus in the thoracic portion. I started the operation with the intention of draining the cavity but changed

¹Zeitschr. f. Chir. u. Gynäk. 1911.

²Zeitschr. f. Chir. u. Gynäk. 1911.

³Zeitschr. f. Chir. u. Gynäk. 1911.

my plan when I saw how well the lung of the patient could be distended and because no aseptic mistake had occurred during the operation. But when at the wound in resection after the death of my patient which had occurred under the mildest general clinical symptoms on the seventh day after the operation I saw the hæmoe wrought in the chest and posterior mediastinum by the retained infected exudate my formerly tentatively expressed belief based on practical experience (*loc cit*) became an absolute conviction. I therefore say that it is our duty to drain the thorax immediately after the operation in all cases of resection of the œsophagus for carcinoma. It is not wise to close it air and water tight.

The method by which drainage can be easily done by employing a differential pressure apparatus—cabinet or chamber—for overcoming the danger of a post-operative acute pneumothorax has been dwelt upon in a former article. Only if the surgeon lacks the proper facilities for drainage is he justified in closing the thorax but in that event he will have to keep a careful lookout for the possible advent of a pleural exudate. While a sudden post-operative rise of temperature is suspicious it may of course be due to various other causes e.g. a developing bronchitis or pneumonia. More suspicious for an

A. Surg. Phila. July

exudate as a corroborating clinical symptom is dullness on percussion over the lower portion of the side of the thorax operated upon and reduction of vocal fremitus. In the presence of the latter apiration should be done immediately even if the general clinical symptoms are favorable. In case a clear yellowish fluid is found as in ordinary pleurisy serological examination may decide whether drainage is required for a sterile exudate can of course be left for absorption. However this will rarely be the case and for practical purposes it is best to consider as infected any exudate in a closed pleural cavity occurring after œsophageal resection. In the large majority of cases the needle will show an accumulation of sero-anguinolent fluid which is to be considered one of the most formidable factors in frustrating a successful issue. In that event free drainage has to be established *on the spot* either by means of resection of a rib as in empyema or by means of a new intercostal opening rather than by reopening part of the thoracic incision. It is possible that in this way patients may still pull through under careful nursing and treatment but it is a risk that had better be avoided. Personally I feel that immediate drainage of the pleural cavity after intrathoracic resection of the œsophagus for carcinoma will improve the prognosis of this operation.

PLASTIC OPERATIONS ON THE STOMACH

AN EXPERIMENTAL STUDY

BY CARL BICK, M.D., CHICAGO

PLASTIC surgical operations upon the stomach have not been tried extensively although anatomic and histologic conditions are inviting. The circulation and anatomic arrangement of the material are favorable and the healing process is very good.

I was first attracted by this field in 1904 when Dr. Alexis Carrel was associated with

me in our experimental work on animal. We developed the idea to form an œsophagus from the stomach by a plastic method. Though our results were not ideal owing to restricted facilities of our laboratory we succeeded well enough to obtain good surgical results. We called the operation the formation of a prethoracic œsophagus and demonstrated our specimens at the meeting of the

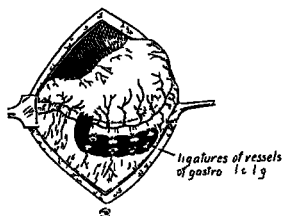


Fig 1

Chicago Medical Society. The procedure carried out on the dog was briefly as follows.

Laparotomy by median incision in upper abdomen stomach brought out of abdomen clamped by long haemostatic forceps gastro-epiploic ligament ligated at several places so as to free the border of the large curvature of the stomach inferior coronary artery ligated near the pylorus on the spot where the plastic flap is to begin. Now the tongue-shaped flap with the coronary artery in the center is

Illinois St. J. 1905

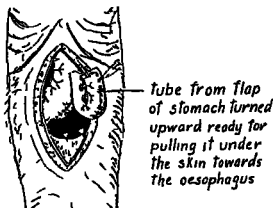


Fig 2

cut long and broad enough to allow the formation of a tube similar in width to an oesophagus. The stomach and tube are sutured exactly. The free end of the tube is now drawn upon the anterior surface of the chest through a slit in the wall above the incision in such a manner that it passes the tunneled skin of the chest wall and its orifice appears upon the surface about midway between xiphoid and jugulum (Figs 1 to 3).

The second step is to form the upper tube from the oesophagus proper. A right lateral

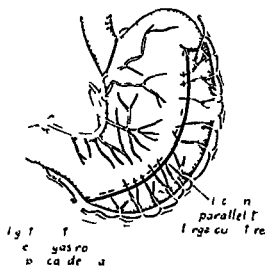


Fig 3

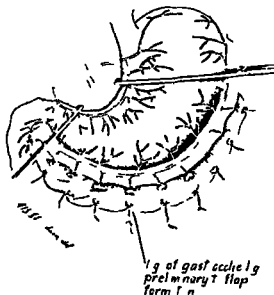


Fig 4

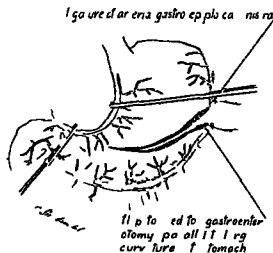


FIG 5

incision of the neck allows exposure of the esophagus which is hooked upon the finger and drawn outward as far as possible the distal part is ligated and dropped back the proximal part passed underneath the skin of the chest through a tunnel to the same spot from which the stomach tube issued the two orifices are now united end to end. Thus a continuous tube is formed from the pharynx

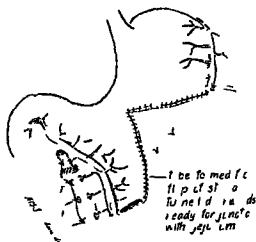


FIG 6

to the stomach running in front of the chest wall—a prethoracic esophagus.

Our surgical results, as I said before were good. Shortly after our demonstration Dr. Carrel left for New York and I did not continue the experiments for some time. They were inspired by the idea of giving the poor sufferer of a relatively slow growing obstruction of the esophagus a better relief than can be obtained with obnoxious gastrostomy.

Our experiments were published in the *Illinois Medical Journal* in 1903, but unfortunately did not find their way into the broad stream of literature so that it remained for a European experimenter to revive them in the *Deutsche Zeitschrift für Chirurgie* four years later and the method became known as the Jannu operation. It has since been performed successfully on the human once also by Willy Meyer of New York who read a paper in Minneapolis on this subject. Naturally the operation will be very seldom performed since the indication is a rare one. However in those cases of extensive and otherwise intractable strictures resulting from erosions of the esophagus or cardia by acid or alkali it might offer good and permanent relief.

During the past year I took up again the thread of experiments in that field this time

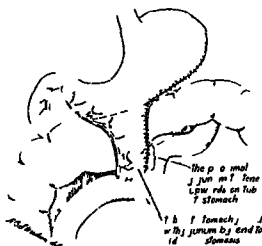


FIG 7



Fig 8 (left) X-ray picture of dog with stomach tube which is filled with beam of light passed into his stomach



Fig 9 X-ray picture of dog six minutes after the food with beam of light had been taken



Fig 10 X-ray picture of stomach with new pylorus (A) filled with beam of light post-mortem

troubled by some of the shortcomings of our present methods of dealing with some of the surgical conditions of the stomach. Cancer and ulcer still dominate surgery of the stomach and gastro-enterostomy has sway over all of the methods of treatment. This is easily understood as it affords relief in many cases, cures a great number of ulcers and is easily performed. All this makes the operation a favored one. But if we control it through fluoroscopy and observation of post-operative results a year after gastro-enterostomy we can conclude that we have by no means definitely solved the problem how to treat an ulcer of the stomach or duodenum. Without going into detail or making suggestion I am going to relate the results of some experiment done during the past year relating to this subject.

I must give to my assistant and associate Dr. W. C. Jones credit for the painstaking operation and for recording the results during this experiment. Most of the dogs were operated by him after I did the first experiment and thus the results were controlled.

First series. The plastic formation of a new pylorus by a flap.

Method. Upper laparotomy the stomach is brought out clamped temporarily below

pylorus and near cardia transversely gastrocolic ligament ligated (Fig 4) coronary artery ligated tongue-shaped flap cut with base towards pylorus (Fig 5) and sutured to a tube (Fig 6). The tube is inserted into jejunum in such manner that the proximal part of the jejunum is fastened alongside this tube so as to avert the vicious circle (Fig 7). Wolfier and Hartman advocate a similar step in anterior gastro-enterostomy. A large number of dogs were operated upon but only one history follows.

Operation. Same as performed on Dog 1 except clamp was used (Method same as described above). **Description of dog.** Small mongrel white with yellow spots on hinder portion of body, black eyes, male. Place 2362 North Clark Street. **Operator.** Dr. W. C. Jones, assistant, none an anesthetic. **Dr. Harz anesthetic.** A. C. E. mixture. **Date.** March 13, 1914. **Remarks.** Operation uneventful though worked at disadvantage on account of having no assistant.

Results. March 20, 1914, dog in fine condition. Dr. Harz assures me that it has been in excellent shape ever since the operation. Wound in skin very slightly infected and the linen has not been entirely licked away. Dog is lively and playful. March 2, 1914, dog continues in excellent condition. April 3, 1914, dog perfectly normal in every way. April 29, 1914, dog perfectly normal in every way. May 6, 1914, dog in fine condition. **Laparotomy.** Produced complete ob-



Fig. 8. Duodenum implanted at pyloric end of stomach. Probe indicates circular location of implant.



Fig. 9. X-ray picture of stomach with implanted pylorus () filled with barium. Post mortem.

struction about three fourths inch distal to pylorus by cutting clear through gut and infold gastric duodenum. Pylorus was entirely unobstructed there being no apparent evidence of the former ligature. The new gastroenterostomy opening was not only patulous the opening being apparently three fourths inch or more long. This fact was ascertained by passing a curved forceps through the pylorus and down the new gastroenterostomy tube into the duodenum. June 3, 1944 dog killed today and stomach and duodenum removed with the intent of taking an X-ray picture after filling with barium. Animal in excellent condition before death and had been ever since last operation. Opening from new tube into duodenum large and apparently functioning as well as the natural pyloric outlet.

The results operatively were good. What made these experiments more interesting was the control examination with the fluoroscope done by Dr. Paul Eisen at the North Chicago Hospital. A stomach tube was inserted into the stomach and filled with barium. The picture shows that it is impossible for the tube to pass through the new stoma but shows that the stomach and new pylorus have a good physiologic function (Fig. 8). Also a number of X-ray pictures taken from such dogs show that the new pylorus is working perfectly (Fig. 9). A number of pictures of the specimens removed

from such dogs filled with barium gave an exact idea of the structure of such a stomach some months after operation (Fig. 10). This tube has no tendency to contract as it is working with its muscular apparatus.

We operated upon some of these dogs a second time and cut the pylorus in the manner of von Linsberg and found the new pylorus after the operation perfectly patulous.

Second series. Implantation of the small intestine in place of resected pylorus.

Method. Upper laparotomy. Stomach lifted out a tube about three inches long of the small intestine cut out of its continuity but left in contact with its circulation the pylorus resected to the extent of three inches and the intestinal tube implanted into this gap by end-to-end union (Fig. 11). A number of dogs were operated upon but only one history follows—that of the fourth dog. A number died shortly after the operation but when the technique was perfected most of them lived.

Operation. Same as previous ones. Three inches of jejunum with preserved circulation implanted to gap of excised pylorus. Description of dog: Jocko II. Yellow and white male. Plac. 2362 N. C. 1 k. St. a. n. s. t. a. D. M. in k. off.



Fig. 3 Patch (A) in small curvature



Fig. 4 Upper picture Defect covered with omentum (a) Lower picture Stomach open showing the defect (A)

anesthetist Dr Harz anesthetic ether Date July 27 1914 Remarks August 14 1914 some vomiting general condition fair dog playful The dog was killed later by Dr Beck

The fluoroscopic examination proved the absolutely good function of the implanted intestine and the examination of the specimen of the dog killed after weeks showed remarkable changes in epithelial structure the epithelium of the jejunum growing similar to that of the stomach There was the tendency of the mucosa epithelium to draw out into tubules close to the scar Lack of time and facilities prevented the physiologic experimentation upon these structures which may yet be done but the picture of the specimen shows the exact union and the \ ray the correct form of the stomach (Fig 12)

Third series The use of an intestinal patch for the stomach defect in the small curvature This experiment was inspired by the difficulty of dealing with the stomach after resection of a portion of the small curvature in a case of ulcer of this region

Method A tube of the small intestine was cut three inches long the circulation carefully preserved the tube transformed into a rectangular flap by cutting it in its periphery

Then a defect similar in shape and size was made by cutting out a portion of the small curvature of the stomach then the patch of the small intestine was fitted by exact stitches into the defect of the stomach The defect healed beautifully and the dogs did well No difficulty was seen except that the specimen showed that the patch retracted considerably (Fig 13) This led to a fourth series of experiments which showed me a remarkable quality of the stomach at least in the dog and explained to me many pathologic conditions which I did not fully appreciate before

Fourth series Resection of large part of the front wall of the stomach and filling of the defect with omentum only without stitching the wall

Method A piece of the stomach wall two to two and one half inches in diameter was cut out sharply the large omentum placed over the defect and fastened to the border of the defect with four single interrupted stitches We were surprised that

all the dogs survived and were doing well. Even a few days after the operation they were lively and ate well and the examination after even a short time as one week, surely after five to six weeks showed that the defect had dwindled to a small point and the omentum covered it up on the outside forming a defense wall against perforation (Fig. 14). This remarkable fact proved to us the possibility of rapid healing of an ulcer if omentum is present on the outside and the wonderful retraction of a defect. If we take into consideration the muscular apparatus, the histologic arrangement of the muscle-fibers and the elastic fibers we understand the facts better. At the same time however it explains to us the tendency of the gastro-enterostomy to close up or to retract as the conditions in both instances are precisely the same. The stoma of the gastro-enterostomy becomes smaller and smaller

and ultimately all the food passes through the old pylorus. It can be proved by the use of the fluoroscope. What will happen in these cases after two or three or four years if we cut the pylorus or obstruct it permanently remain to be seen.

Incidentally I may mention that fascia in this series did not give the same result. The dog died promptly the second day.

15th series. Excision of portions of the stomach and implantation of neighboring flap of the stomach according to the well known laws of plastic flaps.

Needles to try these experiments were all satisfactory and showed to us the possibility of replacing portions necessary after resection of ulcers of the stomach. A great vista opened itself to us with the possibility of a number of other variations which are now under observation and study in the splendid material of the stomach.

A STUDY OF TWENTY FIVE TABETIC BLADDERS¹

B. IRVIN S. KOLLBS, M.D., CH. A.C.O.

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A PREVIOUS report of a bladder picture which seemed to be typical of spinal cord changes associated with locomotor ataxia has subsequently been verified by observing twenty five additional cases. In seven of these the diagnosis was made from the urologic findings before there was any suspicion of a nerve lesion.

The bladder changes as described and illustrated in my previous paper consist primarily of an unusual trabecular formation characterized by a lateral grouping. The area occupied by the so called interureteric ligament remained practically free. These trabeculae are fibrillary and closely resemble the papillary muscles of the heart. Thus fibrillary character and general arrangement differentiate them from the trabeculae of obstruction when they are much coarser and are equally distributed throughout the trigone and occasionally well up toward the vertex.

The interureteric area stands out very prominently and seems to form a line of demarcation between the trigone and the vertex. The blood vessel along this line are increased in size and number.

The other appearance which was present in twenty of the cases is what I have termed a rigid urethral orifice—a condition similar to the Argill Robertson pupil. The rhythmic oristral contraction is either sluggish or absent. Instead of the contraction noted with each extrusion of urine the orifice appears partially or widely gaping. This was more frequently noted to be bilateral but also was in five instances unilateral. In all of the twenty five cases a positive Wassermann was obtained and subsequent examinations by a neurologist showed distinct spinal cord changes.

Arbitrarily I have divided the cases into three classes.

1 Those with vesical symptoms without subjective nerve changes

2 Those with vesical symptoms with subjective nerve changes

3 Those whose symptoms pointed toward renal involvement

Three of the histories briefly cited will illustrate each of these classifications

CASE 1 Male age forty referred by physician who had made a diagnosis of cystitis. Cystoscopic examination showed the bladder picture described above. Diagnosis of chronic prostatitis and urethritis in the presence of a tabetic bladder was made the latter condition verified by a positive Wassermann. Three intravenous injections of neosalvarsan completely relieved the subjective symptoms though the bladder remained unchanged in appearance. The patient has since developed an Argyll Robertson pupil and has had some lightning pains of the arms and legs.

CASE 2 Male age forty three referred by an ophthalmologist whom the patient consulted on account of recent difficulty in reading and also because of having difficulty in emptying his bladder. Both eyes gave the Argyll Robertson reaction urine perfectly clear postate normal cystoscopic findings those of a tabetic bladder Wassermann positive and his bladder symptoms have completely disappeared under antiluetic treatment.

CASE 3 Female age thirty eight had severe attacks of what was typical of a renal colic. Skia graph negative urine contained no blood or pus. Cystoscopic examination showed typical lateral trabeculae and both ureteral orifices widely gaping mucous membrane not inflamed Wassermann positive no history of lues was obtainable no dem-



Illustration which shows the exact findings as described

onstrable nerve lesions. Symptoms have disappeared following four injections of neosalvarsan.

The interpretation to be placed upon this type of bladder changes is not known. Without doubt there are various sets of nerves some of which are involved in the sclerotic changes in the attack upon the cord by the spirochaeta while other nerve bundles apparently remain free as is evident by the fact that the central portion of the base of the organ remains normal.

INTUSSUSCEPTION

NEW POINTS IN THE ETIOLOGY AND A NEW OPERATION FOR THE PREVENTION OF ILEOCECAL REINAGINATION

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THE etiology of intussusception is very obscure. It occurs most frequently before the seventh year, sex, race, previous diseases, general nutrition or activities seeming to bear no relation to its onset. Cathartics, coarse food and pedunculated tumors of the bowel lining favor intussusception but there is no absolute cause which leads directly to the condition.

In my cases of intussusception the anatomical condition that has attracted my attention the most is the length of the mesentery of the terminal ileum and the fact that the descending colon in these cases also possesses a distinct mesentery. These mesenteries were from two and one half to three and one half inches long (see Fig. 1). The mesentery of the terminal ileum in the adult is from two to

all the dogs survived and were doing well. Even a few days after the operation they were lively and ate well and the examination after even as short a time as one week, surely after five to six weeks showed that the defect had dwindled to a small point and the omentum covered it up on the outside forming a defense wall against perforation (Fig. 14). This remarkable fact proved to us the possibility of rapid healing of an ulcer if omentum is present on the outside and the wonderful retraction of a defect. If we take into consideration the muscular apparatus, the histologic arrangement of the muscle fibers and the elastic fibers we understand these facts better. At the same time however it explains to us the tendency of the gastro enterostomy to close up or to retract as the conditions in both instances are precisely the same. The stoma of the gastro enterostomy becomes smaller and smaller

and ultimately all the food passes through the old pylorus as can be proved by the use of the fluoroscope. What will happen in these cases after two or three or four years if we cut the pylorus or obstruct it permanently remains to be seen.

Incidentally I may mention that *saecia* in this series did not give the same result. The dog died promptly the second day.

Fifth series. Excision of portions of the stomach and implantation of neighboring flaps of the stomach according to the well known laws of plastic flaps.

Needless to say these experiments were all satisfactory and showed to us the possibility of replacing portions necessary after resection of ulcer of the stomach. A great vista opened itself to us with the possibility of a number of other variations which are now under observation and study in the splendid material of the stomach.

A STUDY OF TWENTY FIVE TABETIC BLADDERS

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A PREVIOUS report of a bladder picture which seemed to be typical of spinal cord changes associated with locomotor ataxia has subsequently been verified by observing twenty five additional cases. In seven of these the diagnosis was made from the vesical findings before there was any suspicion of a nerve lesion.

The bladder changes as described and illustrated in my previous paper consist primarily of an unusual trabecular formation characterized by a lateral grouping. The area occupied by the so called interureteric ligament remained practically free. These trabeculae are fibrillary and closely resemble the papillary muscles of the heart. This fibrillary character and general arrangement differentiates them from the trabeculae of obstruction when they are much coarser and are equally distributed throughout the trigone and occasionally well up toward the vertex

The interureteric area stands out very prominently and seems to form a line of demarcation between the trigone and the vertex. The blood vessels along this line are increased in size and number.

The other appearance which was present in twenty of the cases is what I have termed a rigid ureteral orifice — a condition similar to the Argyll Robertson pupil. The rhythmic orificial contraction is either sluggish or absent. Instead of the contraction noted with each extrusion of urine the orifice appears partially or widely gaping. This was more frequently noted to be bilateral but also was in five instances unilateral. In all of the twenty five cases a positive Wassermann was obtained and subsequent examinations by a neurologist showed distinct spinal cord changes.

Arbitrarily I have divided the cases into three classes.

FRACTURE OF THE SPINE OF THE TIBIA

By JOSEPH J. KURLANDER, M.D., CLEVELAND, OHIO
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FRACTURE of the spine of the tibia is a rare type of intracapsular fracture of the knee-joint. Often associated with this injury there is found rupture of either one or both crucial ligaments. Investigation has shown that rupture of the crucial ligament may exist without fracture of the tibial spine or fracture of the spine of the tibia may exist without rupture of the crucial ligaments.

Hogarth Pringle published a report (1907) on a case of rupture of the crucial ligaments with avulsion of the tibial spine. In this case he sutured the spine back into position. This is the first recorded operation for this type of injury. In 1888 Sir Rickman Godlee described the lesion that he had found in a leg that was amputated by Enchison in 1873. The injury in this instance had been caused by the passage of a cart wheel over the leg.

Briefly I will describe the anatomy of the superior articular surface of the tibia. On the upper surface of the tibia two articular facets extend upward in the middle of the joint forming the two tubercles of the spine of the tibia. Along the summit of the spine runs a groove anteroposteriorly. This groove opens up at the anterior and posterior ends into the V-shaped intercondyloid fossae. The anterior V-shaped intercondyloid fossa furnishes attachment to the anterior portion of the semilunar cartilage and for the anterior crucial ligament. The posterior fossa offers attachment to the posterior horn of the semilunar cartilage and the posterior crucial ligament. Thus the anterior crucial ligament passes from the inner tubercle of the spine upward backward and outward and is inserted into the inner aspect of the external condyle of the femur. The posterior crucial ligament passes upward forward and inward to be attached to the interior portion of the internal condyle. It lies behind the anterior crucial ligament.

It follows therefore that —

1 When the knee is fully extended the anterior crucial ligament is tense and prevents displacement of the tibia forward on the femur.

2 When the knee is fully flexed the posterior crucial ligament is tense and prevents backward displacement of the tibia on the femur.

3 Both ligaments prohibit inward rotation of the tibia.

Bearing these points in mind one may diagnose an injury of the crucial ligaments quite readily. e. g. if in the extended position the tibia cannot be displaced forward it may be assumed that the anterior ligament is intact. If in full flexion the tibia cannot be displaced backward the posterior ligament may be presumed to be intact. The most constant sign of fracture of the spine of the tibia is an obstruction to full extension of the leg.

Avulsion of the tibial spine is practically always produced by violent traction on the crucial ligaments. It seems logical therefore to assume that extreme violence is necessary to rupture the crucial ligaments. Such violence would in all probability produce complete dislocation of the knee joint.

I wish to report the following case:

J. H. male age 19 was seen in the fall of 1913. He gave the following history: Three weeks previous he jumped off a wagon and in landing on the ground his leg suddenly flexed and he struck his knee on the curbstone. He tried to arise but could not fully extend the leg nor stand upon it because of severe pain. He was removed to a hospital and the leg was placed in a splint.

The leg became greatly swollen and painful and two X-ray pictures were taken and said to be normal. At the end of six days he was discharged from the hospital as cured. Pain and stiffness persisted and he was referred to the East Side Free Dispensary for diagnosis. The leg was painful and swollen and free fluid could be made out in the joint.

A radiograph was taken (Fig. 1) showing a complete transverse fracture of the spine of the tibia. A plaster cast was applied with the leg in full extension and allowed to remain for six weeks. It was then removed and active and passive motion inaugurated. He made a complete recovery with normal function.



Fig. Show the long mesentery of terminal ileum and a mesocolon



Fig. The ileum is shown sutured parallel to the ascending colon. It is to be remembered that as a rule the bowel distended with long mesentery is horizontal in the belly.

three inches long and the ascending colon in the majority of individual has no mesentery at all. It is easy to see how long these mesenteries must be when one considers how far the intussuscepted bowel can migrate. Whether these mesenteries are stretched during the intussusception or are an etiologic factor will be difficult to prove but there seems to be a distinct relation between the two.

As we know that any constriction of the bowel which blocks the return circulation will tend to make the bowel soft and edematous thus reducing its tensile strength it seems to me that this condition should never be reduced by distending the colon with fluid either before or after a laparotomy. Operation should be performed as soon as the diagnosis is made. An incision four inches long to the right of the umbilicus is satisfactory and aids rapid work. The intussuscepted mass is found and after covering with a gauze sponge is milked gently one

hand following the other until the intussusception snaps out. In this way it is not necessary to draw upon the weakened bowel. This method has served me in cases of 96 hours standing and in one with multiple intussusceptions.

In early cases there is a tendency for the intussusception to recur and in order to avoid this accident I have used the following method (see Fig. 2).

The ileum is brought parallel to the ascending colon and sutured to it with three to five catgut sutures. The cecum is fixed in the iliac fossa in some cases with another suture. The fact that as the two bowels are parallel and cannot intussuscept will be at once evident. The long mesentery of these bowels allows them to assume a horizontal position in the belly and we therefore need not consider a kinking of the ileum.

THE TEMPERATURE RANGE AFTER SUPRAVAGINAL HYSTERECTOMY FOR MYOFIBROMATA

DR. I. S. STONI, M.D., WASHINGTON, D. C.

WHEN is the temperature normal? When does it indicate morbidity? Since the introduction of iodine as an anti septic the writer has used it in an attempt to obtain absolutely perfect results in the operations upon uterine myofibromata. It is unnecessary to say that many reasons may be given for failure to obtain an absolutely straight line temperature chart after hysterectomy. In most instances there is an elevation of temperature during the first three days after operation which is due to trauma and not to infection. The writer has found in his own work that almost all the morbidity after hysterectomy is a result of infection about the stump or under the flap of peritoneum near the stump. When patients have infection here it is not a matter of surprise that deep seated pelvic phlebitis may follow and that sudden and even fatal complications such as are due to thrombosis and embolism may occur.

The careful examination during the period of convalescence of all patients subjected to supravaginal hysterectomy will disclose some interesting and important local conditions

not generally appreciated. One of these is the formation of hematomata. Such a complication may and probably does occur most frequently in the space previously occupied by an intraligamentary tumor. That an effusion of blood or serum may and does collect under the peritoneal reflexure of the bladder near or over the stump I have found on more than one occasion.

Another result of hysterectomy with unilateral oophorectomy is that the remaining ovary is often greatly swollen. An examination has shown this in a majority of instances. Obviously this is due to interference with the circulation in the organ. Such ovaries as a rule return to their former size but may not do so if infection occurs and in any event they often appear to resemble the typically cystic ovary when in pected some months after operation.

The formation of hamatomata and the swelling (congestion) of the ovary doubtless influence the temperature curve although suppuration may not occur. These patients as a rule make good recoveries although the convalescence has not been perfectly satisfactory as many charts will show.

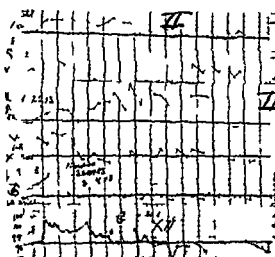
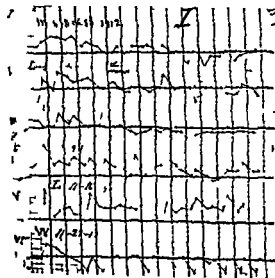




Fig. 1. Transverse fracture of spine of tibia. Negat retouched.

I allow myself to take the liberty of mentioning several cases that came under the observation of Robert Jones of Liverpool and S. Alwyn Smith of Winnipeg from whose paper I have drawn freely.

CASE 1. A young lady fell on a piece of wood and struck her knee at a right angle. When she started to walk she suffered great pain and was unable to extend her leg fully. She walked upon it for a year her knee having become more flexed. She was operated upon — in exploration of the knee joint — in another city but it resulted in increased lameness and stiffness.

On being consulted two years after the accident there was found to be only 30 degrees of movement of the knee joint which could not be fully extended. There were marked tenderness over the head of the tibia at each side of the ligamentum patellae. There remained slight anteroposterior movement of the tibia on the femur. Pain was acute on any attempt at complete extension. Fracture of the spine of the tibia was diagnosed and confirmed by radiograph.

CASE 2. A farm laborer was run over by a wagon. The wheels passed over both knees. He does not remember the exact position of the limbs at the time. The right knee became swollen at times and full extension is impossible. This movement is limited by 35 degrees. Although full flexion is painless there is tenderness over both lateral ligaments.

The X-ray shows that the external tubercle of the spine is fractured and displaced downward. The knee was forcibly extended under anesthesia and fixed for six weeks in this position. Massage and motion

were gradually employed with the result that there is a distinct improvement in the range of motion.

Rupture of Crucial Ligaments. Patient had complete backward dislocation of the tibia into the popliteal space. The knee was reduced and was quite stiff. The leg was put up in plaster of Paris in full extension for six months and the result was a perfect restoration of function. He was last seen running up a rocky slope jumping from rock to rock.

This case answers the question whether or not it is best to operate on recently ruptured crucial. It seems unwise to operate without trying first immobilization in complete extension.

Treatment. The treatment of fracture of the spine of the tibia should be non-operative when seen early. The leg should be put up in full extension in plaster of Paris for six weeks to two months after which good function of the knee-joint may be confidently expected providing however that the fragment is not lodged into the joint so as to block full extension.

When full extension is not possible and in addition there exists disability whether it be pain, stiffness or effusion operation is to be recommended.

Technique. To obtain a good view of the interior of the knee-joint and to simplify the operation the leg should hang over the table with the knee flexed at a right angle. A vertical incision is made through the center of the patella extending from one inch above it to the tubercle of the tibia. The patella is saved vertically and its ligament split. The segments of the patella are separated to the border of the condyles. The fat behind the patella is removed. An excellent view of the spine and anterior crucial ligament is thus obtained. Any obstructive mass is removed and the knee straightened.

If the crucial ligaments are found ruptured they may be sutured. The ligament of the patella, the aponeurosis, and the quadriceps tendon are sutured. It is not necessary to wire the patella. The leg is then immobilized for six weeks after which the dressings are removed and motion commenced.

temperature indicates the condition of the patient. She was a very ill woman with a large degenerating fibroid in the left broad ligament. Ten days after operation we found that a large hæmatoma had formed

under the peritoneal envelope which finally disappeared without suppuration. The pulse was never over 100. The operation was performed November 4, 1913, and she is now perfectly well.

THE GROSS ANATOMY OF THE HUMAN PROSTATE GLAND AND CONTIGUOUS STRUCTURES¹

By OSWALD S. LOWSLEY, M.D., New York
From the Pathological Laboratory, Bellevue Hospital

THIS report is based upon a study of two hundred and twenty-four prostate glands varying in age from one month to seventy-nine years, most of which were obtained from routine autopsies conducted by the pathological department of Bellevue Hospital. These specimens have been studied in gross in sections and microscopically both in serial sections and in sections taken at random. It has seemed wise to consider in this communication only the gross characteristics of the structures at the neck of the bladder as relationships at this complicated area are of the utmost importance to the genito-urinary surgeon.

The prostate gland is located behind the second portion of the rectum at the neck of the bladder which it surrounds posteriorly and laterally. It is encircled by a sheath called the prostatic fascia which is derived from the rectovesical fascia. This rather thin structure contains the vessels of the gland and is found just outside of the true capsule of the prostate. The gland is firmly attached to the bladder and urethra. It is held in position by several structures. Its apex is suspended superiorly by the puboprostatic ligament which connects it with the pubic bone on either side. Inferiorly it is joined to the rectum by the recto-urethralis muscle of the French writers (Poirier and Charpy) which is a reflection of the anterior portion of the levator ani muscle and is of great importance to the surgeon in doing a Young's perineal prostatectomy.

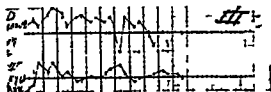
It is necessary to divide this muscle to

prevent the danger of tearing into the rectum. The deep layer of the triangular ligament aids in fixing the apex because it invests the membranous urethra and is attached to the prostate. The lateral borders of the gland are embraced by portions of the levator ani muscle which are separated from direct contact with it by a plexus of veins.

The lymphatics begin as a network around the acini of the gland and pass outward forming another network under the capsule. From this point lymph-channels extend posteriorly to the external iliac glands, the lateral sacral glands and the glands of the sacral promontory. Anteriorly the lymphatics from the membranous and prostatic urethra join with those of the anterior part of the prostate and pass to a gland on the internal pudic artery.

The arteries supplying the prostate are derived from the internal pudic, the inferior vesical and the middle hæmorrhoidal. They are rather small in size and reach the tubules of the gland through branches which enter the prostate in vessels passing through the septa separating the various lobes.

The veins form a plexus around the lateral and anterior surfaces of the gland (plexus of Santorini). They receive in front the dorsal vein of the penis and terminate in the internal iliac vein. The veins of this plexus are particularly large and tortuous on the anterior surface and are a common location for the formation of phleboliths. These pathological structures are found in over 50 per cent of my specimens older than 30 years. Nearly every specimen over 50 years has one or more



Finally in view of the variations in the temperature curve we are led to ask. What is the normal or standard temperature range in supravaginal hysterectomy? Comparatively few of our charts show a normal range of temperature. Some are subnormal as here yet the condition of the patient at no time was suggestive of the least departure from the normal or typically favorable convalescence. In view of the great diversity of opinion regarding a normal chart we have brought these results to your attention and believe that the use of iodine as proposed has proved a valuable aid in securing a better if not a normal convalescence after supravaginal hysterectomy. Our experience with the method has extended over three years during which time we have secured perfect asepsis of the field of operation. The tem-



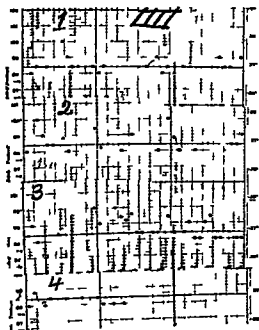
perature range as shown in these charts is not greatly improved by the addition of iodine injection over the results of the former method but we claim greater precision of technique and feel assured that it is possible in this way to entirely eliminate infection about the stump in upravaginal hysterectomy.

The first plate of six charts shows the type with apparently normal recovery. Nothing was found wrong with any one of them. Taken together a very good composite chart may be formed. The highest temperatures are included with the others.

The second series had some slight reason for the rise except No 9, which shows the elevation of temperature (102°) due to lobar pneumonia in the upper half of the left lung from which the patient soon recovered. Effusion under the bladder reflexure was present in three of these patients and was readily located when examination was made. Recovery followed without suppuration.

Abnormal distention due to imperfect preparation of the alimentary canal will send the temperature up as in Chart No III (2 cases) but the pulse rate may not be correspondingly increased. A laxative in these cases promptly brought the temperature down. Chart No IV shows what may happen when the cervical canal cannot be reached and hence is not sterilized previous to operation. In the cases recorded suppuration followed and pus was discharged through the cervical canal which promptly lowered the temperature.

The last chart (No V) shows how little the



vesicles and is tightly joined to the capsule of the prostate. The fascia is a very sharply outlined structure except at the ends of the hornlike process mentioned above. Considerable variation is noticed in the position of its upper border. A common variation is its extension much farther upward than has been described in which instances the upper margin is less concave and may even extend directly across from the upper end of one seminal vesicle to that of the other. The blood supply is limited. Small vessels are observed coursing through the tissue practically all of them being confined to its upper layer or that portion which comes in contact with the prostate gland and the seminal vesicles.

The prostate gland is often described as having the appearance of a horse-chestnut or English walnut but neither of these comparisons seems to be sufficient. Its posterior surface is triangular and flattened. It usually has a depression extending longitudinally in its midline which is most prominent towards the base of the gland and rarely if ever exists at the anterior one third. Its upper border bulges on each side as do the lateral borders due to the fact that the lateral lobes form the main mass of the gland. The upper border receives the ejaculatory ducts after the junction of the vasa deferentia with the seminal vesicles in an elliptical funnel shaped depression. The lateral borders are rounded and there is a fairly sharply defined area between the lateral borders and the upper surface of the gland. In young specimens obtained before puberty there is far less lateral and posterior bulging but the general contour is about the same.

Careful measurements of two hundred and twenty four specimens obtained from routine autopsies have disclosed some very interesting facts. The width of the gland in every instance is greater and the thickness always less than the anteroposterior diameter. There is always greater prominence of the lateral than the middle portions of the base so that in adult prostates the distance from the apex to the lateral prominences exceeds that from the apex to the middle of the base by 0.2 cm to 0.5 cm.

Nearly all of the specimens obtained from

children dying in the first decade were less than five years of age. During this time a very slow gradual increase in size is observed so that at five years of age the prostate is surprisingly little larger than it is at birth. Thirty eight specimens examined showed no abnormalities except one case described in another paper in which there was an obstruction at the lower end of the verumontanum which caused hydronephrosis and ultimately the death of the child at three months of age. The average length of the prostate during the first half of the first decade is 1.2 cm. The width is 1.5 cm and the average length is 0.9 cm. As might be expected the greatest development of the prostate occurs during puberty. In ten specimens examined which were older than 15 years the average length is 3.0 cm which is more than twice the size at the fifth year. There is even a greater increase in the width the average being 3.8 cm the height or thickness averages 2.1 cm. It is thus seen that the gland assumes almost adult proportions during the latter part of the second decade. During the third decade the prostate reaches adult size. Any change in dimensions after that time is only a matter of a few millimeters. The forty glands measured vary in length from 2.8 cm to 4.0 cm the average being 3.3 cm. The width shows a greater variation the narrowest being 3.6 cm and the widest being 5.2 cm. There is no gross evidence of adenomatous hypertrophy in the latter specimen. The average width is 4.1 cm while the average height or thickness is 2.4 cm.

Thirty three specimens obtained from individuals who died during the fourth decade of life show a slight falling off in size the average length being 3.15 cm a little less than in the preceding decade. The width is 4.1 cm and the length 2.55 cm which is a trifle more than in the third decade.

Forty two specimens between 40 and 50 years are a little larger than those of the younger periods. The length is 3.45 cm width 4.0 cm and thickness 2.65 cm. There is less change in the measurements of the various glands observed and there seems to be slightly more uniformity as regards size.

The prostate gland reaches its maximum

it projects into the bladder. All of the small specimens and most of the large ones are unilobular but a number of the larger specimens are trilobular, the enlargement being divided into three distinct masses. In my opinion this division is brought about by the pressure caused by the muscular bands so-called 'Bell's muscles' extending from the ureteral orifices to the upper end of the verumontanum and forming the lateral borders of the trigonum vesicae. These trilobular tumors exist often as masses joined tightly together at the base. Occasionally they are entirely separated from one another. One of the specimens has a middle portion which is almost entirely overlapped by the two lateral. It has been called to my attention by Dr H W Plagge-meyer¹ of Detroit and borne out by my own observations that a true middle lobe enlargement does not project through the sphincter but when that portion of the gland enlarges alone it lifts the sphincter up as well as the apex of the trigonum and is always outside of the sphincter although it may cause it to be thinned out markedly by its upward pressure. Glandular hypertrophies at the vesical orifice show a very complex anatomical arrangement and this subject is worthy of a much more thorough study.

General enlargement of the prostate gland occurs most frequently among those past 60

Verbal common section

years which have been grouped as old age specimens. Thirty-one and two-tenths per cent of the thirty two specimens obtained from subjects of this period have a moderate general enlargement of the gland. The younger groups have comparatively few enlarged glands among their number. One specimen slightly enlarged occurs in the third decade. In the group comprising the fourth decade 12.1 per cent show adenomatous hypertrophy of slight degree while during the fifth and sixth decades the percentage of enlarged prostates is 16.7 and 10.3 respectively. Fourteen and one-tenth per cent of all specimens examined over 20 years of age have a general enlargement. By grouping all specimens over 30 years 17.5 per cent are found to be enlarged (See Table II).

The ureters pass obliquely through the vesical wall in such a way that upon distention of that organ pressure is exerted upon the tubular structures completely occluding them. It is important to the surgeon who catheterizes and operates upon ureters to know the length of that part of the ureter which is contained within the bladder wall. In the series of cases here investigated four hundred and forty-eight ureters were measured and the following averages for the various decades of life are noted. From the time of birth up to five years of age the distance of the ureter through the vesical wall is 0.75 cm.

TABLE II
SHOWING THE OCCURRENCE OF ABNORMALITIES

Age	Hypertrophy of Albarana Group			General Hypertrophy		Hypertrophy of Subtrigonal Group	N of Specimens	Percent- age of Albarana Hypertrophy	Percent- age of General Hypertrophy	Percentage of Sub- trigonal	Percentage of Abnor- malities
	Large	Medium	Small	Large	Slight						
First decade to 10 years							38				
Second decade to 20 years											
Third decade 20 to 30 years							40	5	5		7.5
Fourth decade 30 to 40 years			7		4		33	7.3		3	4
Fifth decade 40 to 50 years			4		6		4	3.8	6.7		40.5
Sixth decade 50 to 60 years							29	7	3	3.4	2.9
Old age 60 years and older	3	3	3	7			3	9.3		5	16
Total for all ages	8	7	2	6	9	3					

Percent 30 of Albarana's hypertrophies. If ages considered
Percentage of general hypertrophies all ages considered
Percentage of Albarana's hypertrophies after the 20th year

Percentage of general hypertrophies after the 20th year
Percentage of Albarana's hypertrophies after the 20th year
Percentage of general hypertrophies after the 20th year

15
7.5

size during the sixth decade at which period all of its dimensions are increased slightly more than the post puberty glands. The twenty nine specimens obtained show the following averages Length 3.65 cm width 4.37 cm thickness 2.75 cm

There is a very slight decrease in the size of the thirty two prostates older than 60 years which have been examined. The subjects from whom these specimens were obtained died at ages varying from 60 to 79 years. Frankly hypertrophied glands are not considered in this discussion. By comparing figures it is seen that the old age prostates average about the same size as those of the third decade being a little larger than those of the post puberty period and somewhat smaller than those of the sixth decade. In length they vary from 2.6 cm to 4.5 cm with an average of 3.23 cm the average width is 4.12 cm the smallest being 3.0 cm and the largest 5.0 cm. The prostate having the greatest thickness measured 3.6 cm the least 2.0 cm while the average for all glands of this period is 2.47 cm. (See Table I)

Abnormalities occur in the series of specimens concerned in this report in a great many more cases than is generally supposed. Out of the two hundred and twenty four specimens of all ages including thirty eight under five years of age there occurred sixty one cases of abnormalities of the prostate gland itself or accessory structures. Of these thirty three or 14.7 per cent are enlargements of Albarran's subcervical group of glands with resulting obstruction to urinary outflow twenty five cases of general glandular enlarge-

ment are found which is 11.1 per cent of the entire number collected. Therefore 25.8 per cent of all specimens show some obstruction at the vesical neck. There are enlargements of the subtrigonal group of three of the specimens, but in none of them is the enlargement sufficient to cause obstruction.

The largest number of enlargements of Albarran's group occur at the fourth decade during which period 27.3 per cent of my specimens show this complication. In the fifth decade there are 23.8 per cent with Albarran's hypertrophies and 17.2 per cent during the sixth decade. Only 5 per cent of the third decade prostates show an enlargement of the subcervical group and before this age no such abnormality is observed. It is interesting that 23.8 per cent or more than one out of every five prostates show this important condition after the thirtieth year.

The enlargements of the subcervical group of Albarran vary a great deal in regard to their size and shape. About 50 per cent of them are small in size and consist of a single projecting nodule which pushes its way up from the floor of the orifice and within the vesical sphincter for varying distances in such a way that in the relaxation of the vesical orifice the nodule has a tendency to drop outward and that tendency is augmented by straining so that more or less obstruction is caused by every enlargement of this sort the amount of obstruction depending not only upon the size of the structure but upon the extent to which

Specimens prepared by heating in 70% alcohol and after the method of Mall in which the connective tissue is dissolved. I would say however that the use of muscular structure and gland tissue above the nodule in which Albarran's group is superimposed upon the floor of the vesical sphincter.

TABLE I
SHOWING CHANGES IN SIZE OF THE PROSTATE GLAND AT VARIOUS AGES

Age	Number of Cases	Length		Width		Thickness	
		Variation	Average	Variation	Average	Variation	Average
First decade 10 to 20 years	38	cm to cm	cm	to cm	cm	0.7 to 1 cm	0.9 cm
Second decade 20 to 30 years		to 3 cm	3 cm		3.8 cm	1 to cm	cm
Third decade 30 to 40 years	40	2 to 4 cm	cm	6 to 5 cm	cm	to 3 cm	2.4 cm
Fourth decade 40 to 50 years	53	to cm	3 cm	to 5 cm	cm	6 to 3 cm	5.3 cm
Fifth decade 50 to 60 years		2 to 6 cm	4.5 cm	6 to cm	cm	3 to 3.5 cm	3.6 cm
Sixth decade 60 to 70 years	59	4 to 5 cm	3.6 cm	to cm	cm	2.4 to 3 cm	2.8 cm
Old age, 70 years and older	3	6 to 4.5 cm	3.23 cm	to 3 cm	cm	to 3.6 cm	2.7 cm

ment In the cases of enlargement of the sub cervical group the urethra is very much lengthened at this point but since such abnormal cases are not included in the measurement it is concluded that the upper end of the posterior urethra tends to lengthen in the later years of life so that in old age the average measurement from the beginning of the urethra to the upper end of the verumontanum is 1.85 cm

The verumontanum formed by the in growth of the wolffian and mullerian ducts assumes various shapes and sizes at different points The usual arrangement is for the upper end to rise abruptly from the floor of the urethra its greatest height and width being at the point where the ejaculatory ducts and utricle open into the urethra which is usually about 0.3 cm below its upper end From this point on the structure usually tapers off gradually until its fibers have become distributed among those of the floor of the urethra and it disappears at its lower end by spreading out in one to four or five bands of tissue some of which may become attached to the lateral walls of the urethra Its length in the first decade is 1 cm During the second it becomes increased to 1.5 cm and at the third period it assumes adult size and is nearly 2.0 cm throughout life The width and height follow rather closely the length in regard to reaching adult proportions which are a little over 0.4 cm in either direction and about twice the size of the structure in the first decade

The seminal vesicles and the lower portions of the vasa deferentia are bound together by a fascia which I have called the intervesicular fascia It is made up of three portions the most prominent being the posterior leaflet which is composed of two layers It extends around and between the two seminal vesicles and posterior to the vasa deferentia The seminal vesicles are thus suspended in a sac like structure the posterior layer of which extends directly across from one vesicle to the other The anterior layer after encircling the vesicles joins the posterior lamella at the border of each vesicle and becomes intimately attached to it thus forming a two layered rather firm fibrous fascia The middle portion is formed by a two-layered structure which envelops the vasa deferentia in a similar man-

ner The third or anterior lamella is a single layered fibrous structure extending from the anterior and lateral surfaces of one seminal vesicle to those of the other at which point it is attached to the encircling portions of the posterior part of the fascia described above In most instances the upper border of this fascia extends somewhat higher than the fascia of Denonvilliers and the two structures are easily separated being in direct contact only at the lateral surfaces of the seminal vesicles At other places the two structures are separated by a considerable amount of fatty and areolar tissue

The intervesicular fascia is not nearly so firm as that of Denonvilliers Its posterior leaflet is the strongest portion the middle or that portion which encircles the vasa deferentia is the weakest The three lamellae combined hold the seminal vesicles and vasa deferentia in a very definite envelope which is of considerable importance in surgery of this region This structure is undoubtedly a barrier to the extension of carcinoma and may explain why cancer of the seminal vesicles is usually confined to those structures for such a long period of time without extension to surrounding tissues and organs The type of pain which accompanies acute infections of the seminal vesicles is explained by the fact that these organs are contained within a sacculated fascia The intervesicular fascia corresponds fairly well to the area of the trigonum vesicæ and reinforced by the fascia of Denonvilliers forms a firm support to the bladder wall at this area and is an additional factor in preventing the formation of diverticula in this region The elevation of the lower portion of the trigonum vesicæ in true middle lobe hypertrophies is materially influenced by the fibrous unyielding character of this fascia and the yielding nature of the bladder wall

The seminal vesicles attain adult size during the third decade The average of a great many measured shows that in health they remain practically the same size after this period Enlargement of these structures occurs in 32.4 per cent of all cases over 20 years of age The greatest period of affection is during the third decade at which time 42.5 per cent are abnormal The right seminal

and the average size of the ureteral orifice is 0.1 cm. During the second decade there is an increase in the length of the ureter within the wall of the bladder to 1.6 cm. and it remains about the same throughout except that there is a slight increase in this measurement in the latter years of life it being 1.7 cm. in the 15th decade and 1.9 cm. in old age. The ureteral orifices do not show any marked change after the second decade at which time they are 0.25 cm. in length and are nearly always scaphoid in shape although they may be mere slits or exactly circular. There are a great many variations in the appearance of ureteral orifice and one may find any shape like the small circular orifice which looks like a pin hole to a long narrow slit 1.0 cm. long.

The trigonum vesicae is formed by the muscular and connective tissue bundles extending from each ureter to the vesical orifice which are superimposed upon the bladder wall. The fibers from its apex connect with the upper end of the verumontanum and are seen to be arranged in a varying number of fold usually two or three. This structure is normally an equilateral triangle although the base or distance between the ureteral orifices is often a little less than the distance between ureter and the vesical orifice. In the first decade the average trigonum measures 1.2 cm. This increases in the second decade to 1.6 cm. During the third period it reaches adult size 2.2 cm. and remains practically the same throughout adult life.

The superposition of the trigonum upon the bladder wall as described by Lieutaud can be demonstrated by Mall's method already described in which the structure is dissected entirely free from the vesical wall (Fig. 3).

Asymmetry of the trigone occurs with considerable frequency. In my series it occurs most frequently in the fourth decade. Fifty-nine of the entire number of specimens or 26.3 per cent. show a considerable difference in the distance of the two ureters from the vesical orifice. This variation may be as much as 1.2 cm. and in this day of instrumental investigation of the bladder and ureters this is an important consideration. In adults the ureters may be as near to the vesical orifice as

1.5 cm. or as far from it as 5.0 cm. Eight and one half per cent. of my specimens have a trigonum vesicae more than 1.0 cm. larger than normal while 2.7 per cent. are unusually small without other signs of abnormality. Seventeen specimens or 7.6 per cent. show an hypertrophy of the trigonum vesicae which stands out markedly superimposed upon the bladder. It is in every such case somewhat contracted with a deep fossa behind its base. This condition rarely if ever occurs before the fourth year.

Abnormalities in the structure of the trigonum vesicae are very frequently met with. The existence of an hypertrophy of the group of fibers extending from one ureter to the other is so common an occurrence that a so-called interureteric bar is taken for granted in adults. There come across a number of specimens in which there is apparently no tissue extending from one ureter to the other but there is a distinct bundle extending from each ureter to the vesical orifice. Frequently bundles of fibers extend toward the middle line and then curve rather sharply toward the apex forming a wide V shaped structure. Several of the specimens show the remarkable condition of a bar extending from one ureter just to the midline where it tapers off short and extending from the other ureter to the orifice of the bladder there is a well marked bundle of fibers.

The prostate develops in such a manner that its main bulk lies behind the urethra and lateral to it. There is comparatively little of the gland anterior to the lumen of the urethra. At the apex of the gland there is about an equal distribution of tissue anteriorly and posteriorly. In every young specimen the urethra proceeds through the gland almost in its center except at the base where there is even before the time of puberty a preponderance of tissue posteriorly.

As persons grow older there is a gradual increase in the distance from the vesical orifice to the upper margin of the verumontanum. Up to the fifth year this measurement averages 0.55 cm. During the second decade the length of this portion of the posterior urethra is increased to 1.2 cm. and from that age on there is a slow gradual increase in its measure-

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TABLE III
SHOWING ABNORMALITIES OF SEMINAL VESICLES

Age	Right Enlarged			Left Enlarged			Both Enlarged			Atrophied		
	Large	Small	Light	Large	Medium	Right	Left	Medium	Light	Right	Left	Both
First decade to years												
Second decade to 20 years												
Third decade 20 to 30 years												
Fourth decade 30 to 40 years												
Fifth decade 40 to 50 years												
Sixth decade 50 to 60 years	3	3										
Old age 60 years and older						3						
Percentage of enlarged seminal vesicles more in years	3			Percentage of enlarged seminal vesicles in 6th decade			3			3		
Percentage of enlarged seminal vesicles in fourth decade	30			Percentage of enlarged seminal vesicles in sixth decade			1			1		
Percentage of enlarged seminal vesicles in old age				Percentage of enlarged seminal vesicles in old age								

vesicle is enlarged three times as often as the left in this series there being thirty seven cases of the former and ten of the latter and ten in which both sides are symmetrically enlarged. There are five cases of atrophy of both structures (See Table III).

The ejaculatory ducts pass obliquely through the prostate. They retain their embryological characteristics of rising rather precipitously through the prostate until they are within a short distance of the lumen of the urethra in the verumontanum at which point they turn and course through the verumontanum parallel with the axis of the urethra finally opening laterally on the surface of that structure in such a manner that there are left thin flaps over their orifices which act as valves on distention of the posterior urethra. They open on a level with the upper portion of the utricle and in none of the two hundred and twenty four specimens studied have I found an ejaculatory duct opening into the utricle. Irow has reported three hundred cases examined with no instance of an ejaculatory duct opening into the utricle.

The mouth of the utricle is very small in the first decade considerably larger in the second and reaches adult size in the third. It varies greatly in size and shape the average adult size is 0.15 cm. The shape of the orifice is a longitudinal slit which varies greatly as to its width. Often the orifice is small and round in other cases the longest diameter is

obliquely or transversely disposed and occasionally it is semilunar in shape. In one or two instances the orifices of ejaculatory ducts and utriculus prostaticus are elevated and look like little craters. The depth of this interesting vestigial organ is rarely very extensive since it is usually completely contained within the tip of the verumontanum. Occasionally however it extends to the base of the prostate in which case it measures over 1.0 cm. During the first four decades it is less than 0.5 cm. in length but in later years it becomes a trifle more extensive as shown in the accompanying table (See Table IV).

SUMMARY

The veins of the prostate are numerous and in old age large and tortuous. They are located for the most part on the anterior surface and the lateral borders of the gland. Calculi are quite commonly found in them. These vein stones are found in 50 per cent of all specimens over 30 years of age and in every specimen over 50 years.

The so called median groove of the prostate is a depression which extends parallel with the axis of the gland and is found only in the posterior two third of that structure the anterior third being rounded. The width of the gland in every instance is greater and the thickness always less than its length. There is a very slow gradual increase in the size of the prostate from birth to five years of age. It increases very rapidly in size during the

TABLE IV
SHOWING MEASUREMENTS OF ACCESSORY STRUCTURES

Age	Length of Ureter Through Vesical Wall	Size of Uteral Orifices	Size of Trigonum Vesicae		Distance from Vesical Orifice to Verumontanum	Size of Verumontanum			Utricle	
			Ureter to Vesical Orifice	Distance Between Ureters		Length	Width	Height	Size of Mouth	Length
15 years	75 cm.	m	cm	cm	55 cm	cm	cm	cm	01 cm	4 cm
20 to 30 years	1.6 cm	5 cm	6 m	4 cm	cm	5 cm	3 cm	4 cm	cm	5 cm
30 to 40 years	45 cm	4 cm	cm	cm	3 cm	cm	4 cm	3 m	7 cm	5 m
40 to 50 years	75 cm	3 cm	4 m	m	6 cm	8 m	45 cm	46 cm	5 cm	5 cm
50 to 60 years	1.65 cm	35 m	45 cm	3 cm	35 cm	95 cm	45 cm	49 cm	9 cm	7 cm
60 to 70 years	2.7 cm	cm	cm	cm	75 cm	7 cm	43 cm	43 cm	3 cm	7 cm
70 years and older	9 cm	5 cm	cm	3 cm	85 cm	85 cm	43 cm	5 m	9 cm	86 cm

years of puberty so that just after this period it is more than twice as large in every dimension as it was preceding this age. During the third decade the gland reaches its maximum size. It shows a very slight decrease in size in old age.

Changes in the prostate gland or other contiguous structures causing abnormality of greater or less degree at the vesical orifice occur in sixty-one cases out of two hundred and twenty-four studied. Fourteen and seven tenths per cent of the entire number of glands observed show an enlargement of Albarran's subcervical group of tubules. Most of these occur after the thirtieth year so that 22.8 per cent of the specimens older than this show such an abnormality. General enlargement of the prostate occurs in 11.1 per cent of all the glands studied. There are three enlargements of the subcervical group. The usual Albarran's group enlargement is unilobular. Occasionally this enlargement may be divided into three portions. There are two types of obstruction with intravesical projection at the posterior portion of the neck of the bladder. The most common is an enlargement of the subcervical group with projection from within the sphincter; the second type is an enlargement of the middle lobe proper which develops outside of the sphincter and projects into the bladder by lifting the apex of the trigonum vesicae.

The ureters pass obliquely through the vesical wall in such a manner that intravesical pressure causes occlusion of their lumina.

The length of the ureter contained within the bladder musculature varies at different ages. During the first decade it averages 0.75 cm in length. Its length is much increased during the second decade at which time it becomes 1.6 cm in length and during later years in life increases only slightly. In adult life the uterine orifices are scaphoid in shape and about 0.25 cm in their greatest diameter. They vary greatly however in shape and size.

The trigonum vesicae is normally an equilateral triangle in which the base or the distance between the ureters is occasionally less than the other legs of the triangle. It reaches adult proportions during the third decade and in normal cases remains unchanged throughout life. Anatomically it is formed by tissue derived from the ureters and superimposed upon the bladder wall as described by Lieutaud. Abnormalities of the trigonum are rather common. 26.3 per cent of the specimens in my series show an asymmetry of this structure. The difference in distance between the ureter on each side and the vesical orifice may be as great as 1.2 cm. The base of the trigonum in adults may be as near to the internal sphincter as 1.5 cm or as far from it as 5 cm. Seven and six tenths per cent of the specimens show an hypertrophy of this structure. This does not occur in any instance before the fortieth year. There are a great many abnormalities in the arrangement of the muscular bundles comprising the trigonum vesicae.

There is a great increase in the distance be

tween the vesical orifice and the upper margin of the verumontanum. This distance is 0.55 cm. in the first decade. During the second it increases to 1.2 cm. and from that time on there is a gradual lengthening of this portion of the posterior urethra until in old age it reaches a distance of 1.85 cm. Enlargement of Albarran's subcervical group greatly augments this measurement.

The verumontanum assumes adult size during the third decade. It is attached to the trigone above by small bundles of fibers. Below the entrance of the ejaculatory ducts and utricle it gradually decreases in size its fibers spreading out in small bundles on the floor and occasionally on the lateral walls of the urethra.

The seminal vesicles and lower ends of the vasa deferentia are bound together by a structure composed of anterior middle and posterior lamellae. This fascia is of interest because it tends to prevent the dissemination of carcinoma of the seminal vesicles to contiguous structures; it causes a true middle-lobe hypertrophy of the prostate to project into the bladder and it supports the base of that viscus. The seminal vesicles attain adult size during the third decade and normally do not enlarge after that period. Abnormal enlargement occurs in 32.4 per cent of all cases over 20 years of age. The right side is enlarged three times as often as the left. Atrophy of the seminal vesicles occasionally occurs. There are five cases in my series.

There has not been found a single instance in which an ejaculatory duct opened into the utricle in this series. Porosz reports three hundred cases without any such abnormal arrangement. The utriculus prostaticus is usually contained within the summit of the verumontanum. Occasionally it extends to the base of the gland. During the first four decades it is less than 0.5 cm. in length. In later years it becomes a trifle longer. Great variation is noticed in the size and shape of the mouth of the utricle but the usual arrangement is a longitudinal scaphoid slit. One interesting specimen had its orifice entirely occluded by a membrane.

In no instance has there been found an hypertrophy of the ventral or the posterior lobes of the prostate or the apex group of tubules although I have a clinical case in which there is a decided enlargement of the latter which is probably due to chronic infection and is subsiding under treatment.

The following conclusions are drawn from this study:

1 The width of the prostate in every instance is greater than the height always less than its length.

2 The prostate gland develops very slowly until puberty at which time it increases enormously in size assuming proportions which are twice those previous to this period. It reaches a maximum size during the third decade.

3 One out of every four specimens observed shows an obstruction of greater or less extent at the orifice of the bladder.

4 Asymmetry of the trigonum vesicae frequently occurs (26.3 per cent of my cases).

5 The upper portion of the posterior urethra continually lengthens from birth until death.

6 The seminal vesicles and the lower end of the vasa deferentia are enveloped in a triple-layered fascia which is of great importance surgically. Enlargement of the seminal vesicles occurs in one-third of the cases over 20 years of age the right being affected three times as often as the left.

7 The ejaculatory ducts rarely if ever open into the utriculus prostaticus.

In conclusion I wish to express my thanks to Dr. Charles Norris, Dr. Crawford and Dr. Vance of the pathological department at Bellevue Hospital and to Dr. Hugh H. Young of Baltimore for their many courtesies.

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NERVE-BLOCKING¹

By M L HARRIS M D CHICAGO

IT has been the aim of surgeons from time immemorial to render surgical operations painless. While the early attempts undoubtedly mitigated somewhat the pain of operations success in this line cannot be said to have been achieved until the advent of ether and chloroform. The use of these agents produces an abolition of consciousness and during this state no pain is perceived. For years after the discovery of these and other general anesthetics the abolition of consciousness was considered essential to complete freedom from pain during operations but following an article by Koller in 1884 on the anesthetizing effect of cocaine when applied to the mucous membrane of the eye much experimentation was done in order to determine the practical value of cocaine when applied locally to mucous membranes or when injected subcutaneously in producing local anesthesia so that the part could be operated on without pain. It was found that cocaine when applied to a mucous membrane would produce practically complete anesthesia although somewhat superficial in character and that when injected subcutaneously an area of anesthesia would be produced varying in duration and extent depending upon the strength of the solution used. The very high toxicity of cocaine made the subcutaneous use of this drug for its local anesthetizing effect so dangerous as to limit the practical applicability of the method to comparatively slight operations and after enjoying a rather brief period of favor the method fell into disuse except in certain cases.

It was observed very early that if the cocaine solution were injected in close proximity to a sensory nerve trunk the area of anesthesia was not limited to the region injected but extended to the entire region supplied by the nerve with which the solution had come in contact. It seems that but little use was made of this principle at the time but shortly thereafter the anesthetizing effect of cocaine

when injected into the central spinal canal was brought forward and spinal anesthesia became quite popular but its high mortality soon put a check to its general adoption.

The possibility however of producing anesthesia sufficiently for surgical purposes without the abolition of consciousness was demonstrated and the desirability of the method together with its great advantages provided it could be freed from the dangers due to the toxicity of the substances used at once became apparent.

The search for something less toxic than cocaine led to the discovery of a number of substances which when applied locally produce anesthesia. Among these may be mentioned the various forms of eucaine, tropocaine, stovaine, alpin, orthoform, cycloform, novocaine, etc. None of these substances possesses anesthetizing properties to the same high degree as does cocaine but they are all less toxic than cocaine. Of these substances novocaine seems to be the best as it possesses a comparatively low toxic coefficient combined with high anesthetizing properties. It is also readily soluble in water and will stand a reasonable amount of boiling without decomposition.

While experiments show that novocaine is only about one-seventh as toxic as cocaine it should not be forgotten that serious and even fatal results may follow an overdose. The amount of novocaine that can be injected without producing toxic symptoms varies considerably and depends largely upon the rapidity of absorption. If a plain watery solution be used and injected in a region where absorption is rapid 0.3 gms. to 0.4 gms. may produce symptoms but if the solution be one which absorbs slowly 0.5 gms. to 1.0 gm. may be used without danger. The more rapid the absorption the less marked the anesthesia for it requires a certain length of time for the drug to act. The addition of adrenalin to the solution materially increases the degree and duration of the anesthesia.

Hoffmann has found that the addition of $\frac{1}{4}$ of 1 per cent to 1 per cent of potassium sulphate also materially increases the duration of the anaesthesia and that he was able to produce anaesthesia with a much weaker solution.

I have found in my own work that by the addition of calcium chloride in varying strengths the anaesthesia may be prolonged to two or three hours without difficulty and that a weaker solution may be used than without the calcium chloride. The formula which I am using at present and which has given me the best results is novocaine $\frac{1}{4}$ to 1 per cent calcium chloride $\frac{1}{4}$ to $\frac{1}{2}$ of 1 per cent chlorbutanol 8/10 of 1 per cent in distilled water to which are added 4 to 5 drops of the 1 to 1000 adrenalin solution to 30 ccm of the mixture. It is very essential that the mixture be properly prepared and the method which I use is as follows: The distilled water is sterilized by boiling. The novocaine is then added and the boiling continued not to exceed two or three minutes as prolonged boiling spoils novocaine. When this has cooled down to below 160° Fahr. 10 gm. of chlorbutanol is added to every 100 ccm of the novocaine solution. Water dissolves only about 8 of 1 per cent of chlorbutanol but 1 per cent is added merely as an easy way of insuring a saturated solution. The undissolved part simply settles at the bottom. A 2 per cent to 4 per cent solution of calcium chloride in distilled water is made and sterilized and then the chlorbutanol added the same as to the novocaine solution. The solutions are kept separate and mixed just before using. In this way the percentages of the ingredients may be quickly varied to suit the particular case. The adrenalin should never be added until just before using as it is very unstable and soon spoils if left standing in the solution which is indicated by the solution gradually turning a reddish color. The adrenalin solution should be comparatively fresh and if it has turned reddish in color it should not be used. The chlorbutanol is added because it has distinct anaesthetizing properties of its own and being soluble in lipoids increases the anaesthetizing effect of the novocaine.

If this solution be brought in contact with a nerve it penetrates the nerve and interrupts or blocks the passage of nerve impulse at that point. If the nerve be a mixed one afferent impulses are blocked before efferent. If the blocking is complete no afferent impulses can travel along the nerve at the point of blocking hence no sensations having their origin in the region supplied by the nerve blocked can be perceived. Sensations are of several kinds touch pain temperature pressure etc. When a nerve is blocked the sensations are not all lost at the same time. Pain is lost first and pressure last. The prick of a pin may be recognized after it ceases to be at all painful and pressure can usually be recognized after touch is lost.

On making an incision through the abdominal wall for example it is found as might be expected that the skin is the most sensitive. The subcutaneous fat is but slightly sensitive while the muscle and parietal peritoneum are quite sensitive. I have observed several times that the patient would complain of feeling the cutting of the muscle when absolutely nothing was felt when the skin or peritoneum was cut. The complete absence of muscular rigidity and of increased abdominal tension is a certain indication that the peritoneum where it is being handled is anesthetized. When the abdomen is opened under a circumscribed blocking it is very interesting to rub or draw on the parietal peritoneum outside of the blocked area and to note the character and location of the sensations described by the patient. For instance if the lateral parietal peritoneum be drawn on as may be done usually when there are adhesions between the colon and the lateral wall the patient at once complains of a pain in the side. Rubbing the peritoneum over the bladder or over the lower abdominal wall causes a sensation in the bladder with the desire to urinate. On rubbing the peritoneum of the cul de sac of Douglas the pain is referred to the rectum.

The uterus and ovaries are not particularly sensitive when touched but if the infundibulopelvic or the broad ligament be drawn on pain is produced which is referred to the lateral wall of the pelvis. Handling or draw

ing on the gall bladder and ducts causes pain referred to the back. The appendix is absolutely insensitive but ligating or drawing on the mesenterium causes a pain similar to an intestinal colic which is referred to the region of the umbilicus with gagging and if persisted in vomiting may be induced. This may be prevented very readily by simply injecting the root of the mesenterium with the anæsthetizing fluid. The same kind of a pain may be produced by drawing on the mesentery of any part of the intestine and it is so characteristic that it may be called the intestinal pain.

As the principle of nerve-blocking consists in reaching the nerve in continuity at the most accessible point between the part to be operated on and the spinal cord or the brain it necessarily follows that one should be a good anatomist in order to block successfully. One should know too the limitations of the method although it may be said that its field is continually increasing with improved technique.

LIMITATIONS AND AVAILABILITY

We will take up now the limitations and the availability of nerve blocking more in detail. As might be expected the method is not suited to operations on infants or children too young to be governed by reason as they resist and struggle through fear uninfluenced by the presence or the absence of pain yet I would not place a definite age limit as I have operated on a little girl of five years for a good sized inguinal hernia without any difficulty. The limitation is not so much one of age as one of uncontrollability. An adult may be uncontrollable as well as a child.

Almost any operation may be done on the lower extremity by blocking the sciatic at its exit from the pelvis or at the gluteal fold and the anterior crural at Poupert's ligament. If the operation is in the region supplied by the lesser sciatic or the external cutaneous these nerve likewise must be blocked. The upper extremity may be operated on by blocking the brachial plexus at the root of the neck or for operations on the forearm or hand the nerve trunks can be easily reached in the arm. The superficial cervical plexus is

blocked for operations on the neck and there is nothing more satisfactory than an operation for goiter under nerve blocking. Operations on the face tongue and scalp can be done and I have trephined twice both patients expressing themselves as suffering no pain.

The complete operation for the removal of the breast and axilla can be done by blocking the brachial plexus the acromial and clavicular branches of the superficial cervical plexus and from four to six of the intercostal nerves.

The method is ideal for hernias as the region is so easily blocked by injecting the ilio-hypogastric and the ilio inguinal nerves near the anterior superior spine of the ilium. One of the most satisfactory regions to block is the perineum including everything from the sacrum behind to the symphysis in front in either sex. This region is blocked by injecting into the sacral canal. A needle about 10 to 12 cm. in length is introduced into the sacral canal through the open space between the sacrum and the coccyx. This space is closed with a dense ligamentous structure which is readily recognized as soon as the needle touches it. The patient is placed on the right side with the limbs sharply flexed. With a fine hypodermic the skin and subcutaneous tissue are injected so there will be no pain on passing the larger needle. The long large needle is then introduced detached from the syringe at an angle of about 45 degrees with the surface of the body at that point. The needle is introduced into the sacral canal a distance of from 5 to 7 cm. One should now wait a few seconds to see that no blood or cerebrospinal fluid escapes from the needle the one indicating that the point of the needle is probably in one of the larger veins surrounding the cauda the other that the needle has punctured the lower end of the sac of the central spinal canal. In either case the fluid should not be injected until the point of the needle has been changed to another location. The spinal sac usually ends at about the upper edge of the third sacral vertebra. When the needle is in the proper place from 30 to 40 ccm of a 1 per cent solution containing from $\frac{1}{4}$ to $\frac{1}{2}$ of 1 per

cent of calcium chloride is introduced slowly. Anesthesia begins in a few minutes and extends from behind forward. It requires as a rule from twenty to thirty minutes for the anesthesia to be complete. Occasionally I have found that the amount first injected was insufficient to produce complete anesthesia so now I do not withdraw the needle at once but allow it to remain *in situ* and if on testing the part at the end of ten or fifteen minutes it seems that the anesthesia is not going to be complete 10 or 15 ccm. more of the fluid may be injected. In this way complete anesthesia can always be produced. Under this anesthesia any operation on the lower bowel perineum vagina vulva urethra cervix, prostate etc may be performed without a particle of pain.

By regulating the amount of fluid injected the anesthesia may be made to include the entire sacral plexus.

For operations on the kidney the eleventh and twelfth dorsal and the first lumbar nerves are blocked as they escape from the intervertebral foramina. The abdominal wall may be blocked at any point so that the cavity may be opened painlessly. Any operation within the cavity may be done which does not draw on the mesentery or other peritoneal folds or ligaments, or which does not involve the unblocked parietal peritoneum anteriorly or posteriorly. So long as the manipulations are limited to those organs which are innervated no pain is experienced. Packing off the intestines from the pelvis or other region necessarily draws the mesentery and the packing comes in contact with unblocked parietal peritoneum hence pain is produced. Therefore in operations involving the painful parts mentioned my plan is to open the cavity under nerve-blocking then give the patient a little nitrous oxide gas and oxygen during those manipulations which are known to be painful. As soon as this part of the operation is finished the gas is discontinued and the operation completed under the nerve blocking. Following this method many of the cases receive no general anesthetic some receive a little gas, and all are awake and conscious long before leaving the table and throughout a large part of the operation.

Any method of producing anesthesia for surgical purposes if more or less new must possess some advantages over old and well-established methods if it is to gain general recognition. The question therefore at once arises, What advantages has nerve blocking over general anesthesia as produced to-day?

In the first place it is less dangerous. It will be admitted that practically all substances used for this purpose are more or less toxic but the degree of toxicity is comparatively well known and as the substances are injected locally to affect nerve trunks and not used generally to affect nerve centers it is easier to guard against an overdose. The method is devoid of the dangerous and unpleasant complications which so frequently follow the use of general anesthesia particularly ether and chloroform such as pulmonary irritation pneumonia nephritis suppression of the urine acidosis, nausea vomiting headache gaseous distention of the stomach etc. Patients recover from the effects of the anesthetic much quicker in fact they frequently are able to take and often ask for drink or light nourishment on reaching their room. Without wishing at this time to enter into a discussion of the nature and cause of shock it may be said that if the blocking is complete no shock whatever follows operations done by this method save that due to loss of blood for without afferent impulses no shock follows injury.

The presence of consciousness is no disadvantage in fact it is frequently of great advantage to have the patient conscious. In my experience the great majority of patients prefer being conscious and look upon the loss of consciousness as one of the greatest drawbacks to an operation. The psychic element in these cases has been greatly overestimated. The horror of an operation is based on first the fear of pain second the loss of consciousness and third apprehension as to the outcome. The assurance that there will be no pain eliminates the first element. The fact that consciousness is not lost eliminates the second. The third element or apprehension as to the outcome is present just the same whether the patient be conscious

or unconscious I have found however that patients are inclined to look upon operations that can be done without the loss of consciousness under nerve blocking as less severe than when a general anæsthetic has to be used

One other thing in favor of nerve-blocking is that it teaches the surgeon to be more gentle and more considerate of the patient

It is surprising what can be done in the abdomen for instance by being gentle with out producing pain and there is no doubt that the less tissues and organs are mauled about the less shock there is whether the patient be conscious or unconscious

It is desirable in many cases to give a hypodermic of morphine and atropine or scopolamine about three-quarters of an hour before the operation as it quiets the patient and relieves the irksomeness of lying still in one position so long

During the past few months I have done under nerve blocking two hundred and thirty four operations on two hundred and seventeen patients. The following list shows the wide applicability of the method

OPERATIONS

A groma enous		
Amputations		
Breast		
Leg	7	
Foot	5	
Scrotum		
Adenitis		
Cervical		
I gunal	5	
Appetectomy	2	
Adhesions	34	
Abdominal		
Duodenal		
Cyst	5	
Cheek		
Ovary		
Breast	5	
Cystocele	3	
Colostomy		
Carbuncle neck		
Cervical rib		
Cirrhosis liver (T lma peration)	1	
Decompresso operation skull		
Epilethoma		
Lap		
I gunal region		
Erectosis, on calculus both		
Fractures		
Plate		1
Reduction		3
Fistula		
Rectal		9
Appendiceal		1
Gastrostomy		1
Gastro-enterostomy		1
Hernia		
I gunal		34
Femoral		1
Ventral		3
Hæmorrhoidectomy		14
Hydrocele		3
Hysterectomy		6
Ileocolostomy		1
Intestinal obstruction		2
Kidney fixation		4
Osteomyelitis leg		2
Polyp		
Rectal		1
Cervical		
Urethral		1
Perineal section		2
Prostatitis (drain)		
Perineorrhaphy		4
Peroneal nerve sutured		1
Ptosis eye lid		
Rectocele		1
Rupture patellar ligament		1
Resection rib		
Sinus mucous fibroid in gyna		1
Splenetic abscess		1
Stone		
Kidney		1
Ureter		1
Bladder urinary		
Bladder gall		3
Scar Tissue		
Finger		1
Neck and chin		1
Sphincter (rectal) dilatation		1
Thyroidectomy		13
Trachelorrhaphy		1
Ulcers, rectal		1
Uterus fixation		3
Vanicocele		3
Tumors		
Testis		
Abdominal wall		3
Urinary bladder		1
Cystostomy (suprapubic)		2
Anæsthesia for other operators		3
Number of patients operated on		7
Number of operations performed		234
Number of failures		6
Number of cases in which gas was used in addition to blocking		27

There were seven deaths two due to hyperthyroidism two to uræmia, following prostatectomy one to delirium tremens due to acute dilatation of stomach on the fifth day and on the seventh day following extensive removal of the cæcum and ascending colon for carcinoma

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Standing out in sharp contrast with the arthritides just mentioned are the very late manifestations of bone and joint involvement occurring as the result of a previous typhoid infection. They may occur as early as the fourth week and rarely appear later than the eighth week. They appear just about the time when it is believed that the intestinal ulcers must have healed.

The arthritides complicating pneumonia as a rule appear during the second week of the disease that is from the tenth to the fourteenth day. Arthritis of pneumococcus origin rarely makes its appearance before the crisis. The streptococcic arthritides always appear much earlier than do those of pneumococcus gonorrheal or typhoid origin; they are much more severe in their clinical course and manifestations and are very much more difficult to manage in their fulminating stage. The non streptococcic group of joint infections as stated do not occur early in the course of the disease but sometime during the period of convalescence or recrudescence of the active pathologic process when one would expect that as the primary lesion had apparently healed no further trouble was to be apprehended.

Another clinical observation of value in determining the etiologic factor in these cases is the fact that in most cases the metastasis in the joint or the localization of infective micro-organisms in the joint can be connected or associated with (1) trauma or (2) exposure as (a) wetting of the feet (b) chilling of the surface of the body (c) over exertion and (d) fatigue. When looked for carefully such an association is rarely found to be absent. The joint involved has either been subjected to repeated traumas slight in severity and not immediately productive of subjective or objective symptoms or the patient has sustained one severe trauma which has left an indelible mark in the tissues of the joint traumatized and has laid these tissues open to subsequent infection. These traumas may be recent or remote. When exposure has been operative as an etiologic factor in connection with the lodgment of infective micro-organisms in the joint tissue it is always a recent affair.

The point which I wish to make at this time and which I desire to emphasize is that the infective micro organisms in the cases now under discussion have been present in the body before the trauma occurred that they have lain dormant for a long or short period of time. Under the conditions mentioned as favoring the development of virulence for the assumption of activity they have lodged in the joint by metastasis producing a typical infective arthritis. Therefore as pointed out by Dr Murphy the term rheumatism is a misnomer because it fails to stand the test of pathologic nomenclature it fails to indicate in any way the nature of the pathologic process present in these joint inflammations. The arthritis produced in this manner is not rheumatism. It is a definite pathologic process a typical metastatic infectious process even though the original focus of the infection may go undiscovered.

In the traumatic infections we must distinguish between two types of cases (a) the cases in which the infective micro-organisms are admitted directly to the surface of the synovial membrane or into the joint cavity by penetration of the joint—a traumatic direct infectious arthritis and (b) the cases in which the joint is not punctured or laid open and in which the trauma merely serves to localize in the joint an infection which is already present elsewhere in the body—a metastatic hematogenous arthritis.

The second group is the one with which we are at this time more particularly concerned. However I do not wish to miss the opportunity to say just a few words on the treatment of these traumatic infections.

TRAUMATIC ARTHRITIS

The pathologic micro-organisms which are admitted into the joint at the time of its penetration will excite a local infection and will eventually destroy the mesothelial cells which protect or cover the synovial membrane—if these cells have not already been destroyed by the trauma. In the joint which is untreated or which is treated improperly the infective products always destroy this synovial mesothelium and then but not until then do the bacteria make their way into the

PATHOLOGY AND TREATMENT OF ACUTE INFECTION (METASTATIC) ARTHRITIS

WITH A DESCRIPTION OF J. B. MURPHY'S FORMALIN AND GLYCERIN INJECTION METHOD

By IRID C. ZAPIFI, M.D., JACOB C. COSS

THE treatment of the acute arthritis involves a definite plan of procedure one which is based on the pathology present in these cases. The exciting factor may be a variable one but the results of its activity are always the same i.e. the clinical picture varies with the cause the pathologic picture never. Dr J. B. Murphy's dictum pronounced with so much emphasis on many occasions namely that *every type of non-traumatic joint infection is a metastatic manifestation of a primary infection in some other part of the body* is sound because it is based on pathologic principles and may therefore be accepted as being strictly in accord with the clinical picture of these cases. His belief in an idiopathic rheumatic or dactylic arthritis is confirmed and strengthened by extended clinical observation. In the very nature of things such a condition as an idiopathic non-traumatic arthritis is a pathologic impossibility. Extended observations both experimental and clinical in the Murphy service at Mercy Hospital bear out the correctness of this statement.

These arthritides are always of bacterial origin primarily although bacteria may be and usually are absent from within the joint cavity early in the disease process a fact which has led to errors in treatment. For example in cases of gonorrheal arthritis the gonococcus is not found in the joint fluid or effusion in from 20 to 93 per cent of the cases depending on the time which has elapsed between the appearance of the synovitis and the date of the aspiration. The inflammatory fluid appears in the joint cavity long before the gonococcus makes its way through the synovial mesothelial layer of the joint membranes into the free joint cavity. The retention of the bacterium which is responsible for the arthritis in the vascular and the submesothelial layers of the synovial membrane accounts for the early negative

bacterial findings in the fluid aspirated from the joint in so many of these arthritides. It is not primarily a surface infection of the synovial membrane but an intramural one.

Further in a fairly large number of these cases the original source or focus of the infection cannot be ascertained although that fact does not preclude the existence of such a focus. Such cases have been termed "idiopathic arthritis or cryptogenic arthritis." If these arthritis are examined carefully and are subjected to the various serologic tests now employed by all careful observers the original focus of infection of which the arthritis is a metastatic manifestation may be located. It is evident then that in order to treat these cases accurately and effectively it is absolutely necessary to ascertain the etiologic factor to counteract its influence by a vaccine and if possible to eradicate it from the body entirely.

TIME OF METASTASIS

The time of occurrence of arthritis following an infectious disease or a metastasis of an infection elsewhere in the body is often of value as a means of determining the nature of the particular exciting cause in a given case. For instance gonorrheal arthritis practically always makes its appearance in eight to twenty days after the first appearance of the discharge. The arthritides following scarlet fever usually appear from the eleventh to the sixteenth day after the onset of the initial symptoms of the disease i.e. during early convalescence. The arthritis follows rather closely on the heels of the disappearing acute symptom so much so that it apparently merely represents another stage of the disease when in fact it is a sequel. These arthritides are all of streptococcal origin. This period of onset corresponds with many of the original infections produced by non-identified organisms.

the most virulent type. They destroy the synovial membrane covering quickly and lead to ankylosis unless the case is seen early and managed properly.

The multiple or polyarticular types of infection are rarely initiated with a chill and ankylosis seldom results. The condition is caused by less virulent varieties of bacteria. The clinical course is less acute. It is of shorter duration and the joint is apparently left in as good condition as it was before the onset of the trouble. There is however a class of cases of multiple arthritis in which the infecting micro-organisms are intensely virulent. The chill occurs early and is severe in degree. The clinical course of the process is very acute, rapidly progressive and may in fact often does terminate in ankylosis of many joints involving for instance the hips, knees, ankles, elbows, fingers, jaws and even the spine. Fortunately these cases are few.

Needless to say the immediate treatment of these cases is not only difficult but it is very unsatisfactory although it should not be regarded as entirely discouraging. The multiplicity of the joints involved makes it impracticable to apply extension to every joint but it may and should be applied to the larger joints such as the hips, knees, elbows, ankles and wrists leaving the treatment of the smaller joints for a subsequent time. The treatment is identical with that to be employed in the mono-articular type of disease because the constitutional reaction to the injection of a few joints materially benefits the joints that are not injected.

While this is not the time to discuss the vaccine treatment of these cases it is rapidly becoming the most valuable treatment of multiple arthritis of the so-called rheumatic type. The autogenous vaccines are to be preferred yet if such a vaccine cannot be obtained appropriate stock vaccines mixed vaccines freshly prepared should be used.

Following the infection of these joints is noted first a synovitis which Murphy has classified as follows: (a) Simple serous non suppurating (b) fibroid infiltrating cicatrizing ankylosing (c) rheumatoid absorbing infiltrating osteoplastic periarthral ossifying (d) suppurative (e) tuberculous

luectic etc. The simple serous non suppurating type is caused by metastases from acute infections elsewhere in the body such as an acute pharyngitis an accessory nasal sinus infection tonsillitis gastro-intestinal disorders genito-urinary diseases influenza etc. The destructive ankylosing type follows in the wake of the former when the infections are of the superlative degree. The fibroid infiltrating cicatrizing variety occurs with the low grade infections coming from the alveolar processes, teeth, tonsils, pharynx, large intestine, gall bladder etc. The colon bacillus is found to be the exciting cause more often than any other organism. The so-called rheumatoid joints are the metastatic manifestations of chronic infections located in the alveolar processes, post nasal accessory sinuses, tonsils, pharynx, genito-urinary tract etc.

INDICATIONS FOR TREATMENT

The indications for treatment are: (a) To relieve the patient of pain (b) to prevent the destruction of tissue and subsequent deformity or ankylosis of the joint (c) to preserve the function of the joint.

The plan of treatment first outlined by Dr. J. B. Murphy many years ago and which is employed in his service in Mercy Hospital at the present time consists of the following steps:

- i. *The relief of intra-articular tension by aspiration.* Much of the pain in the joint from which these patients suffer is caused by the increased tension in the joint-cavity produced by the accumulation of fluid and infective products. This is easily and quickly relieved by aspiration. In general the procedure is as follows: The skin at the site of the puncture wound is painted with tincture of iodine and then under gas or local anesthesia it is punctured with a tenotome. Next the needle (short bevel) of an aspirating syringe is carefully introduced into the joint. In the case of the knee the puncture is made one inch above and one inch to the outer side of the patella. The needle is directed through the subcutaneous tissues then under the patella and on into the joint. In all other joints the needle enters the joint at

submesothelial lymph channels and into the tissues outside of the joint. If these mesothelial cells are not destroyed, if the surface of the synovial membrane remains smooth and normal in its structure, the bacteria remain in the joint without effecting any tissue changes, and eventually become avirulent. Therefore, on the basis of the pathologic process involved in these cases, the indications for treatment are (1) to prevent the destruction of the synovial mesothelium and (2) to remove the infectious material from the joint or to render it innocuous.

This is done by (1) closing the joint capsule with fine plain catgut approximating the synovial surfaces as accurately as possible by making an ectropon of the cut edges and without drainage of the joint cavity, but draining the subcutaneous cellular tissue down to the joint capsule. (2) immediately injecting the joint with a 2 per cent solution of liquor formaldehyde in glycerin (a procedure which will be described in detail later) and (3) applying a Buck's extension.

The joint may be aspirated and again injected with this formalin and glycerin mixture within twenty-four hours if the tension in the joint is great or if the patient's temperature is rising even without any increase in tension in the joint. The aspiration and injection may be repeated in two, three or four days, depending on the constitutional manifestations and the clinical course of the joint lesion.

These injections are made as often as is necessary. The procedure when carried out as it should be has been followed with good results so that it is the established method of treatment in all these cases in our clinic. As a rule two or three injections suffice to sterilize the joint-cavity completely. Aside from the aspiration and injection of these joints the essential feature of the treatment is that *the joint cavity is not drained*. In any synovial lined cavity that is exposed to the air for a considerable period of time the mesothelial cells are destroyed, fibrous synchæ form or possibly even a bony ankylosis. Therefore drainage of a joint is to be avoided if possible. The treatment outlined above should be instituted immediately after the

occurrence of the injury if the best results are to be obtained. It must be understood, and I wish to emphasize this point, that if any of the joint structures have been destroyed before the treatment is instituted, the injection into the joint of formalin and glycerin or of anything else will not restore the integrity of destroyed tissues. In other words, it will not cause regeneration of tissue. This particular mixture merely neutralizes, as it were, the infective products, the poisons and destroys the virulence of the bacteria thus preventing the further destruction of tissue. That becomes a very essential matter when it is borne in mind that ankylosis is frequently a sequence of this type of lesion.

METASTATIC ARTHRITIS

The second group of cases of arthritides, the cases of hæmatogenous or metastatic origin, includes the cases in which one or more joints may be involved either simultaneously or successively. The arthritis is usually initiated by a chill or severe chilly feelings and is commonly followed by diffuse pain in the muscles, bones and joints. In from twelve to thirty-six hours after the chill the process as a rule localizes itself in one joint, sometimes in several joints. The clinical evidence of this metastasis is a sudden severe pain and effusion in the joint, affected tenderness to touch, swelling and loss of motion or restricted motion because of the pain.

These patients usually give a very definite clinical history, one which portrays the successive steps of the lesion in the order of their appearance, resembling the so-called syndrome of symptoms described as occurring in some other pathologic processes. These symptoms occur so regularly and in so definite an order that they may well be termed a syndrome. It is a clinical observation that ankylosis often is the final process in these cases of arthritis, particularly when the lesion is initiated by a chill, therefore the initial chill should be accepted as a distinct warning of the final result. This point cannot be emphasized sufficiently often nor too strongly. The micro organisms concerned in the production of these acute arthritides are all of

fective or chronic arthritis should be considered incomplete without resorting to the method as practiced by Dr Murphy

The effect of this mixture in the joint is fourfold

First It renders the fluid in the joint a poor culture medium

Second It induces an increased polynuclear leucocytosis

Third The lymph spaces in the neighboring tissue are clogged by infiltration with these leucocytes so that the infection is localized in the joint The polynuclear leucocytosis in the joint fluid gives up a trypsin ferment which converts the albuminous substances into peptones thus rendering them more easily absorbable and increasing phagocytic action many times

Fourth A constitutional or general leucocytosis is also produced

The method of injection is as follows The same needle which was used to aspirate the fluid from the joint is employed to make the injection It is an ordinary aspirating needle of large caliber with a short bevel After the fluid in the joint has been aspirated the syringe containing it is detached from the needle which is held securely by an assistant with a haemostat and a strong screw syringe containing the formalin and glycerin solution is attached to the needle As it is very difficult to force this mixture into the joint only a screw syringe can be used

The solution used is a 2 per cent solution of liquor formaldehyde (made from the commercial article a forty per cent aqueous solution in glycerin ten drops of formalin to two ounces of glycerin) It must have been mixed at least twenty four hours before it is used *although it may be older* It should be shaken frequently *Never use a mixture that is not at least twenty four hours old* The quantity injected varies with the joint affected For instance fifteen to twenty ccm are injected into the knee joint five to seven ccm into the wrist elbow and shoulder joints and one to two ccm into the smaller joints

The injection is always made with the patient asleep under gas anaesthesia *Never*

attempt to inject the joint otherwise—and the patient must remain in bed Injection in the office is wrong, and bad practice The joint is manipulated freely immediately after the injection is made and the needle withdrawn so as to disseminate the fluid in the joint The opening is sealed with cotton and collodion and the Buck's extension is applied before the patient awakes The injection should be repeated as often as is necessary until the patient is free from pain and the temperature remains normal The patient may complain of great pain for a day or two after the injection and this should be relieved by administering heroin $1/10$ to $1/8$ grain every four hours if necessary The application of ice or cold packs to the joint also gives great relief and exerts a favorable influence in checking the disease process in the joint

Subsequent injections are made in the same manner except that it is not always necessary to aspirate fluid from the joint It should be emphasized that before injecting the formalin and glycerin mixture negative pressure is made on the syringe to determine whether the needle is in the joint-cavity and to estimate from the appearance of the fluid the degree of reaction in the joint resulting from the previous injection This joint fluid is bloody if the reaction has been a favorable one The fluid rises to the top of the mixture in the syringe so that when the joint is injected only the injection solution enters the joint

The various steps in this procedure are each of equal importance and each one must be carried out with painstaking care and promptness Aspiration injection extension and rest is the order of procedure and none of these steps can or should be omitted The patient is not permitted to use the joint until every evidence of inflammation has subsided

The use of vaccines preferably of the autogenous type is always followed by splendid results in these cases and should be employed in every case in which their use is possible They are continued until there is no longer any reaction to their injection

the nearest most available point. Tract in should be made distal to the joint so as to separate its component articular surfaces as much as possible. Care should be taken to avoid injuring the velvety surface of the synovial membrane because as pointed out above if the lining mesothelial cells are abraded or injured so that they die and drop off from the submesothelial tissues the synovial membrane is deprived of its protection and resistance against infective product in the joint cavity and ankylosis may result or the infection within the joint is allowed to spread to the periarticular structures perhaps causing their destruction. Therefore the needle should be introduced slowly and directly without any unnecessary manipulation. By making negative pressure on the syringe piston one can very readily and quickly determine whether or not the needle is in the joint cavity. If it is the joint fluid will flow into the syringe if it is not nothing will appear in the syringe. A heavy screw syringe must be used to make these injections, because the thick formalin and glycerin mixture cannot be forced out into the joint with the ordinary syringe. Plugging of the needle by bits of tissue or thick exudates will also prevent any fluid from appearing in the syringe barrel. In such cases a larger needle must be used.

Opening the joint and draining it which unfortunately is a procedure still employed very quickly relieves the tension but experience has shown that such drainage is followed by ankylosis of the joint in over 96 per cent of the cases. Therefore the treatment of these suppurating arthritides by means of joint drainage is contraindicated. Additional pathologic organisms from without are admitted into the joint when it is opened and drained for any considerable length of time. The joint may be opened and the accumulated infective products removed but the opening must be closed immediately and without drainage. Relieve the tension in the joint by aspiration. The uniformly good results obtained by us recommends the procedure as the proper one for the treatment of these cases. It is based on pathologic principles as well as on clinical experience.

2 *Relief of intra-articular pressure the result of involuntary contraction of the muscles around the joint.* This contraction forces the articular ends of the inflamed joint surfaces together and causes most excruciating pain. The patients state that it feels as though the joint was being jammed together. This pain is relieved very quickly by putting a Back's extension in the limb below the joint at attaching to it a weight sufficiently heavy to overcome the muscular contraction. In some cases five pounds is sufficient but as a rule fifteen to twenty pounds must be used and if the patient is very muscular from thirty to forty pounds or even more should be used. The extension most effectively separates the articular surfaces overcomes muscular contraction corrects malpositions of the limb and prevents destruction of tissue and ankylosis with or without deformity. This extension should be applied immediately as soon as the patient seeks medical advice no matter what the type of arthritis may be. The extension may not always prevent the ankylosis but it always prevents deformity. The Back's extension is applied in fractures. In the case of the knee care must be taken to place the adhesive below the head of the tibia so that it will not make pressure on the external popliteal nerve because such a trauma may be followed by paralysis of this nerve and consequent drop foot. This extension is left on as long as necessary weeks or even months until every evidence of disease in the joint has subsided that is until the temperature is normal and joint motion is free and unrestricted and absolutely unaccompanied by pain.

USE OF FORMALIN AND GLYCERIN MIXTURE

3 *Neutralization of the infection in the joint and the production of a local immunity.* This is the most important step in the procedure. It was for this purpose that Dr. Murphy in 1900 first recommended the use of a 2 per cent solution of liquor formaldehyde in glycerin and the results he and others have obtained from the proper use of this solution in many hundreds of cases have been so good that the treatment of any case of acute in

fective or chronic arthritis should be considered incomplete without resorting to the method as practiced by Dr Murphy

The effect of this mixture in the joint is fourfold

First It renders the fluid in the joint a poor culture medium

Second It induces an increased polymorphous leucocytosis

Third The lymph spaces in the neighboring tissue are clogged by infiltration with these leucocytes so that the infection is localized in the joint The polymorphous leucocytosis in the joint fluid gives up a trypsin ferment which converts the albuminous substances into peptones thus rendering them more easily absorbable and increasing phagocytic action many times

Fourth A constitutional or general leucocytosis is also produced

The method of injection is as follows The same needle which was used to aspirate the fluid from the joint is employed to make the injection It is an ordinary aspirating needle of large caliber with a short bevel After the fluid in the joint has been aspirated the syringe containing it is detached from the needle which is held securely by an assistant with a haemostat and a strong screw syringe containing the formalin and glycerin solution is attached to the needle As it is very difficult to force this mixture into the joint only a screw syringe can be used

The solution used is a 2 per cent solution of liquor formaldehyd (made from the commercial article a forty per cent aqueous solution in glycerin ten drops of formalin to two ounces of glycerin) It must have been mixed at least twenty four hours before it is used although it may be older It should be shaken frequently *Never use a mixture that is not at least twenty four hours old* The quantity injected varies with the joint affected For instance fifteen to twenty ccm are injected into the knee-joint five to seven ccm into the wrist elbow and shoulder joints and one to two ccm into the smaller joints

The injection is always made with the patient asleep under gas anaesthesia Never

attempt to inject the joint otherwise—and the patient must remain in bed Injection in the office is wrong and bad practice The joint is manipulated freely immediately after the injection is made and the needle withdrawn so as to disseminate the fluid in the joint The opening is sealed with cotton and collodion and the Buck's extension is applied before the patient awakes The injection should be repeated as often as is necessary until the patient is free from pain and the temperature remains normal The patient may complain of great pain for a day or two after the injection and this should be relieved by administering heroin $\frac{1}{10}$ to $\frac{1}{8}$ grain every four hours if necessary The application of ice or cold packs to the joint also gives great relief and exerts a favorable influence in checking the disease process in the joint

Subsequent injections are made in the same manner except that it is not always necessary to aspirate fluid from the joint It should be emphasized that before injecting the formalin and glycerin mixture negative pressure is made on the syringe to determine whether the needle is in the joint cavity and to estimate from the appearance of the fluid the degree of reaction in the joint resulting from the previous injection This joint fluid is bloody if the reaction has been a favorable one The fluid rises to the top of the mixture in the syringe so that when the joint is injected only the injection solution enters the joint

The various steps in this procedure are each of equal importance and each one must be carried out with painstaking care and promptness Aspiration injection extension and rest is the order of procedure and none of these steps can or should be omitted The patient is not permitted to use the joint until every evidence of inflammation has subsided

The use of vaccines preferably of the autogenous type is always followed by splendid results in these cases and should be employed in every case in which their use is possible They are continued until there is no longer any reaction to their injection

ACUTE HÆMORRHAGIC PANCREATITIS¹

WITH A CLINICAL REPORT OF EIGHT CASES

By WILLIAM LINDER, M.D., F.A.C.S., BROOKLYN

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MANY epoch making discoveries in the pathology of a number of diseases may be directly attributed to the great progress made in modern aseptic abdominal surgery and many conditions which had heretofore been practically unknown or but imperfectly understood have now been placed on a sound surgical basis. The opportunity to study the living pathology as it has been termed has revolutionized our former conceptions of some of the diseases incident to the region of the upper abdomen and among these acute affection of the pancreas hold a very conspicuous place. To illustrate. In 1894 when Professor Korte of Berlin presented before the German Surgical Society his first paper on acute hemorrhagic pancreatitis there was hardly any discussion so little was then known about this disease. At present however a great deal of progress has been made in the study of the acute diseases of this interesting organ and considerable literature has since accumulated on this subject and as a result of this acute hemorrhagic pancreatitis is no longer regarded as a rare surgical curiosity but is frequently recognized at the operating table and in many cases it has even been diagnosed before operation.

Etioy. Acute hemorrhagic pancreatitis is common to both sexes and may occur at any age though statistics show it to be more frequent among males. In my series of eight cases however there was only one male. Both alcohol and syphilis are said to be very potent predisposing factors. Obesity, cholelithiasis and parturition have also been mentioned as elements favoring the development of acute pancreatitis. The youngest patient in Korte's series was sixteen years old and the oldest seventy. In my own series the youngest was a veteran and the oldest sixty. It occurs most frequently however in the fourth and fifth decades.

The anatomical arrangement of the duct of the pancreas and those of the biliary system together with their proximity and relationship to the intestinal tract predispose the pancreas to frequent infections. It has been shown that a stone lodged in the ampulla of Vater may cause a damming back of bile into the pancreatic duct. Flexner has proved experimentally that by injecting bile into the duct of Wirsung he was able to produce an acute pancreatitis with characteristic fat necrosis. Gulecke in like manner produced an acute pancreatitis by injecting bile, blood or oil into the pancreatic ducts. Clinically again acute hemorrhagic pancreatitis has frequently been found associated with gall stones in the biliary passages. The experimental work of Dauerbauer, Gulecke and von Bergman has further shown that, in acute pancreatitis the free outpouring of the glandular secretion and the absorption of the material, especially when autolysis of the gland itself takes place are responsible for the profound toxæmia with which these patients are afflicted and the absorption of these toxins is frequently the cause of death.

Pathological anatomy. The first contribution on the pathology of acute hemorrhagic pancreatitis is credited to Fitz, who in 1894 published an extensive monograph on the subject and it seems that very little has been added to Fitz' classic description in which he classified acute pancreatitis into three varieties: the hemorrhagic, the gangrenous, and the suppurative pancreatitis. In the acute hemorrhagic pancreatitis the pancreas is swollen and enlarged, and its interstitial tissue as well as the tissue in its neighborhood infiltrated with blood and serum. Microscopic examination shows the presence of cellular and fibrinous exudate with necrosis of the parenchyma. In the chronic form the edema of the subperitoneal edema of necrosis.

attention and which has since been known as fat necrosis.

Gangrenous pancreatitis though it may follow other conditions is usually the result of an acute hæmorrhagic pancreatitis and in at least half of the recorded cases evidence of previous hæmorrhage is present in the altered gland. The organ is enlarged often soft and friable and of a color which varies from mottled red and gray to dark brown or black. By extension of the gangrenous process to the tissues about the organ almost complete sequestration may result. In some cases the completely sequestered pancreas attached by only a few shreds of tissue is surrounded by purulent fluid. Communication may be formed with the intestines and in two cases described by Chan a large mass of necrotic material discharged by the rectum was recognized as gangrenous pancreatic tissue.

The clinical symptoms of both the acute hæmorrhagic and the gangrenous pancreatitis resemble one another very closely. But when the pancreas is found to be gangrenous the illness has been of longer duration proving fatal at the end of several weeks.

Suppurative pancreatitis resembles suppurative inflammation of other organs. The gland is enlarged and may contain abscess cavities of various sizes and the peripancreatic tissue is indurated. This type rarely pursues an acute course but persists for weeks and months and the abscess cavities may discharge into the stomach or duodenum or rupturing into the lesser peritoneal cavity may form here a pus collection of large size. Fitz has pointed out that the disseminated fat necrosis is uncommon with suppurative pancreatitis though always constantly found in association with the hæmorrhagic and gangrenous lesions.

The lesion usually described as acute hæmorrhagic pancreatitis has not the character of an inflammatory process. Widespread necrosis of pancreatic parenchyma is primary and such inflammatory changes as occur are found only at the margin of the necrotic tissue. Similar lesions do not occur in any other organ save perhaps in the stomach where an impaired vitality of the mucosa

is followed by necrosis and subsequent ulceration often with hæmorrhage brought about by the action of the gastric juice upon the injured tissue. The analogy is significant for the pancreas too contains an active proteolytic enzyme which unrestrained is capable of destroying tissue. The peculiar necrosis which affects the parenchyma of the pancreas is no doubt due to the trypsin while the necrosis of fat is caused by the other enzyme the steapsin.

While it has been customary to describe the above diseases as separate entities it is more than likely that they simply represent different stages of the same disease. In mild cases of acute hæmorrhagic pancreatitis the hæmorrhagic effusion is slight and it is possible for resolution to take place with a complete recovery. But if the hæmorrhage is more extensive the process may go on to either a subacute or chronic inflammation or an intense reaction takes place with rapid and extensive destruction of the gland tissue.

Hæmorrhages into the pancreas occurring in an individual previously supposed to be in good health may be the only lesion found to explain the fatal termination of an illness lasting only a few hours. The literature contains numerous examples of so-called pancreatic apoplexy of which the sudden onset and rapidly fatal end suggest an analogy with the more frequent cerebral hæmorrhage. The quantity of blood escaping from the vessel does not bear any direct relation to the severity of the lesion.

Symptomatology. The symptoms of acute hæmorrhagic pancreatitis are not always definite and clear-cut but in a certain number of cases the picture is so characteristic that at least a tentative diagnosis can be made if the condition be borne in mind. The patient is usually in good health when he or she is suddenly seized with sharp severe pain in the epigastric region accompanied by vomiting and followed by rapid development of collapse. In some cases there is a history of occasional attacks of some gastric disturbance or of attacks suggestive of gall stone colic. The pain is very intense and may radiate to the back and is described by some patients as severe splitting backache.

Cyanosis has been a feature in many cases especially over the abdomen. The temperature a rule is not elevated in fact in many cases it is subnormal depending upon the amount of blood the patient is in. Cyanosis is usually very marked. Epigastric examination one finds a distended abdomen with marked tenderness in the epigastrium and to the left and sometimes exquisite tenderness in the left lumbar region.

Of course all these symptoms in themselves are not pathognomonic but a careful analysis of the history of the case will make of onset and the other phenomena as they present themselves will frequently help in establishing the correct diagnosis. It is in acute hemorrhagic pancreatitis much more severe than in any other abdominal condition and is not so readily relieved by the usual dose of morphine. The pain with its radiation to the left lumbar region and the peculiar lack of response to morphine is characteristic of acute pancreatitis than any other upper abdominal condition. The vomiting in acute pancreatitis in contrast with intestinal obstruction is relieved by lavage whereas in obstruction the vomiting is constantly filling up again. Collapse and lividity are striking features in the very severe cases. These in conjunction with the rapid fall in respiration I have found in no other condition except perforated gastric or duodenal ulcers. The latter however can be differentiated from acute pancreatitis by the fact that in perforation there is no abdominal distention or tympany but on the contrary the abdomen is retracted except it is heaved and there develops a peculiar boardlike rigidity with absence of liver dullness and with a previous history pointing to gastric or duodenal ulcer the diagnosis is fairly clear. The temperature in perforation is always elevated due to the spreading infection while in acute pancreatitis the temperature is more apt to be normal or subnormal the process being local for a time at least.

Now in spite of all that has been said it is sometimes impossible to make a differential diagnosis from other upper abdominal conditions before operation but since all acute upper abdominal conditions require immediate

surgical intervention one should not hesitate to explore the abdomen. Again if the temperature is in the normal range the probability of acute pancreatitis with its symptom complex as outlined above I believe that a tentative laparotomy before operation will be made much more frequently. Thus it was my good fortune several months ago to see a case.

A patient in which I ventured the diagnosis of acute hemorrhagic pancreatitis where a malnourished patient with a present abdominal acute intestinal obstruction. The following is a report of the case.

Mr. C. J. George, 55, married, the husband of a well-known physician, was in the hospital for several months with a diagnosis of pancreatic cancer. He was taken to the hospital after a fall from a horse and was found to have a large tumor in the epigastrium and to the left of the umbilicus. The patient was in a very poor condition and was unable to eat or drink. The tumor was found to be a large, firm, and irregular mass.

A laparotomy was performed and a large tumor was found in the epigastrium and to the left of the umbilicus. The tumor was found to be a large, firm, and irregular mass. The patient was in a very poor condition and was unable to eat or drink. The tumor was found to be a large, firm, and irregular mass.

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Here we have a case in which the characteristic symptoms were very suggestive namely the suddenness of the onset the peculiar pain localized in the epigastrium and to the left cyanosis marked prostration and purpura of the bowel and all this practically unmaneuvered the entire symptom complex of acute hemorrhagic pancreatitis.

rhagic pancreatitis True there is no pathognomonic sign in acute pancreatitis but with the vivid description in our mind a probable diagnosis seemed justifiable and exploratory operation was certainly imperative

Bearing in mind the pathology of acute hæmorrhagic pancreatitis one should not hesitate in urging early surgical interference before necrosis and suppuration develop I personally feel very strongly on this point as I know from my own experience and observation that some of the cases lost after operation could undoubtedly have been saved by an early surgical intervention As an illustration let me cite the following histories

CASE 2 Mrs. B. admitted to the Jewish Hospital May 14, 1913. She was 48 years old married 26 years mother of five children Previous menstrual history negative menopause four years ago She was perfectly well until two weeks ago when she was suddenly taken ill with excruciating abdominal pain and according to patient's description had suffered more than during her severest labor pains Pain was not relieved by morphine This continued for two weeks until two days before admission when she had another attack with vomiting abdominal distention and marked constipation

On admission the patient looked intensely ill She suffered agonizing pain was distended had a dry coated tongue and foul breath She looked extremely toxic Her temperature was 102° pulse 120 respiration rapid Examination showed tenderness in the left hypochondrium She was in no condition for immediate operation Gastric lavage and repeated enemata gave some relief

Operation the following day Median incision On opening the peritoneum there was an escape of a small quantity of fluid The intestines were found enormously distended and parietic There was no evidence of obstruction pulsation in the mesenteric vessels was present and of good character but the mesentery itself was the seat of slight induration and the small intestines intensely cyanosed almost black in color Spot of fat necrosis on the omentum

Owing to the extreme distention of the intestines enterotomy had to be performed This was only slightly effective in relieving the distention A cæcostomy was then resorted to The gastrophrenic omentum was then torn through and the pancreas found enlarged and almost free in its bed There was hæmorrhagic fluid in the retroperitoneum A drainage tube and gauze were inserted to the tail of the pancreas The gall bladder was found distended and full of stones but the desperate condition of the patient precluded further manipulation and the abdomen was rapidly closed The patient was very restless and the distention still persisted She then developed an anuria Her

urine the following day was found to contain 10 per cent sugar The cæcostomy wound did not seem to give any relief to the sympathetic parents of the bowel The patient was restless became stuporous and there was distinct evidence of a profound intoxication She later developed involuntary urination and defecation and finally died from exhaustion on the twenty first day after operation

CASE 3 I. R. C. age 57 admitted September 30, 1913 Twenty years ago patient had the first attack of pain in the right side of the abdomen radiating to the back and shoulder with vomiting She had a number of similar attacks until about ten years ago when they suddenly ceased and she has been well since with the exception of persistent constipation and an occasional attack of what she termed dyspepsia for the last few years The present attack occurred two days before admission and began with vomiting after an evening meal developing later severe pain in the left side of the abdomen On admission temperature 100 pulse 122 respiration 22 Patient looked very ill Suffered from pain and abdominal distention and was very tender in the left side of the abdomen

Operation the following day High rectus incision spots of fat necrosis on omentum and mesentery intestines deeply congested and cyanosed pancreas acutely inflamed with areas of hæmorrhagic and gangrenous degeneration Hæmorrhagic fluid in the lesser peritoneal cavity Drainage inserted down to the pancreas and the abdomen closed Patient did not react well there was bleeding from the abdominal wound and she became very restless there was a rise of temperature to 104.6 pulse 160 marked prostration Did not respond to stimulation Vomited coffee ground material involuntary urination and defecation She died the following day with symptoms of a marked intoxication

In contrast to this let me report the history of the next cases

CASE 4 H. F. admitted to the Jewish Hospital May 3, 1913 The patient was a male 32 years of age enjoyed good health until nine weeks ago when he was taken ill with an attack of pain in the abdomen for which he was treated in another hospital for a few days and was then sent home no diagnosis having been made Three days before admission he was awakened from his sleep by severe abdominal cramps and vomiting The pain continued for two days accompanied by marked constipation On admission his temperature was 100.4 pulse 98 respiration 40 His abdomen was enormously distended There was marked tenderness in the left side of the abdomen Urine showed a specific gravity of 1.030 acid trace of albumin and a trace of acetone The patient obtained great relief from enemata with the expulsion of flatus and good bowel movements He was given nothing by mouth and was operated on the next day

Operation Right rectus incision On opening the peritoneum a few drachms of free fluid escaped

The intestines were distended and markedly cyanotic no fat necrosis was observed the pancreas was palpated and found enlarged firm and indurated the gastrophrenic omentum was opened and a quantity of bloody fluid was liberated spots of fat necrosis were found on the pancreas Rubber tube drainage and iodoform gauze were applied to the tail of the pancreas and the abdomen was closed The patient ran a moderate febrile course for a few days and suffered from considerable distention His condition gradually improved however drainage was removed on the eighth day and patient made a very satisfactory recovery and was discharged on the eighteenth day after operation cured.

CASE 5 Lizzie B. age 48 admitted October 30 1912 Married mother of four children menopause twelve years ago Diagnosis acute hemorrhagic pancreatitis For the past three years has been complaining of epigastric pain which was localized and bore no relations to meals Recently pain became more marked occurred more frequently and was accompanied by chills fever and vomiting On admission temperature 100 pulse 124 respiration 28

Operation the following day Abdomen opened gall bladder normal fat necrosis on omentum which was friable pancreas exposed lesser peritoneum contained a quantity of odorless serous sanguineous fluid an area of about 2 inches of necrosis in tail of pancreas Tube gauze drainage down to pancreas Recovery rapid and uneventful Discharged on the twenty fourth day after operation

CASE 6 Ray L. age 49 admitted October 17 1913 Married mother of nine children menopause six years ago Diagnosis chronic cholelithiasis and subacute pancreatitis Has been suffering from stomach trouble for the last twenty four years consisting of pyrosis eructations and constipation During the last six years has had a number of attacks of pain in the right hypochondrium extending to right shoulder with vomiting Was operated on for gall stones two years ago with complete relief of all symptoms until present attack three weeks ago when she developed severe abdominal pain with marked prostration Has since had frequent similar attacks with chills and fever Examination showed a short very obese woman with a distended abdomen, suffering from intense pain and tenderness in the right hypochondrium and epigastric regions She was placed under observation in the hospital for some time and was operated on November 9 1913 Abdomen opened pancreas found hard irregular nodular and enlarged A quantity of bloody fluid found in the lesser peritoneal cavity with fat necrosis Recovery good Discharged from the hospital on the thirtieth day after operation

CASE 7 Pearl K. age 9 admitted December 9 1913 Married two and one half years mother of one child Menstrual history normal Has had recurrent attacks of pain in the right hypochondrium radiating to right shoulder blade Pain also in the epigastric region Has had chills, vomiting

and jaundice clay colored stools and dark urine Operation day after admission Right rectus incision Gall bladder contained a number of stones Spots of fat necrosis on viscera of upper abdomen Head of pancreas enlarged Gall bladder drained, rubber tube and gauze drainage to pancreas Discharged on the eighteenth day with good recovery

Operative diagnosis Since as stated before it is impossible in many cases to make a pre operative diagnosis, it is important when opening the abdomen to bear in mind the characteristic lesions associated with this disease which are as follows

1 The presence of an odorless, serosanguineous or beef juice fluid in the peritoneal cavity

2 The presence of fat necrosis in the form of sulphur yellow spots which appear disseminated over the omentum the mesentery and the parietal peritoneum This is an unmistakable and pathognomonic sign of acute hemorrhagic pancreatitis

However in some cases coming to operation early both of these findings may not be present on opening the abdomen Then the pancreas should at once be palpated and if this appears swollen it should be exposed when the hemorrhagic fluid around the pancreas together with fat necrosis may be discovered as it has been my experience in some of my cases

One of the diseases that acute hemorrhagic pancreatitis is frequently mistaken for even when the abdomen is opened is acute intestinal obstruction high up especially when the characteristic fluid and fat necrosis is not discovered This happened to me in three consecutive cases in each a condition presenting itself at operation calling for a differential diagnosis between acute pancreatitis acute intestinal obstruction and mesenteric thrombosis all cases in which I strongly suspected acute hemorrhagic pancreatitis Upon opening the abdomen in these cases I found no fat necrosis and no serosanguineous fluid but the small intestines appeared so markedly cyanotic as to suggest either mesenteric thrombosis or a strangulation due to some mechanical obstruction But bearing in mind the clinical picture of these particular cases and before ventrating all

the viscera and thus producing a great amount of injury to the organs and shock to the patient I at once palpated the pancreas found it swollen exposed it and obtained the characteristic serosanguineous fluid in the retroperitoneal space with fat necrosis on the pancreas

I should like to mention one other sign that I have observed and that is the change in the consistency of the omentum. The omentum seems to have lost its peculiar fatty or oily feel and has assumed or gives a sensation of being granular or gritty to the touch. In operating on three cases for gall-stones this peculiar condition of the omentum led me to suspect and expose the pancreas as complicating the other conditions, and the characteristic lesions were found.

In the severe diseases of the biliary tract suppurative pancreatitis and localized abscesses are frequently overlooked and the recurrent pain after gall stone operations is often attributed to unremoved stones or to the formation of new stones. In this form of pancreatitis we very rarely if ever find the characteristic fat necrosis which is always present in the acute hæmorrhagic pancreatitis.

Complications. Among other complications incident to any peritonitis, one especially peculiar to acute pancreatitis is post-operative hæmorrhage. The location of this gland in a region so abundant in large blood vessels and the corrosive action of the pancreatic ferments on these vessels may cause a severe and fatal hæmorrhage. Such hæmorrhages may occur immediately after operation or many weeks later. I lost one patient from repeated hæmorrhages the last one of which proved fatal on the seventy fourth day after operation. The history of this case is as follows:

tion great distention of the abdomen and exquisite tenderness on the left side.

Operation on day of admission. High rectus incision. Large quantity of reddish fluid in the peritoneal cavity. Omentum studded with spots of fat necrosis. On opening the gastrohepatic omentum a quantity of hæmorrhagic fluid was evacuated. Rubber tube and gauze drainage inserted to the pancreas. The patient was returned to the ward in fair condition. Her convalescence was complicated by an attack of acute nephritis and later by an acute parotitis. She had frequent elevations of temperature. She finally began to show signs of improvement but on the forty-eighth day after operation she complained to the nurse of feeling very ill. She became pale her pulse was imperceptible she was covered with cold clammy sweat and profuse bleeding from the wound was noticed. She recovered from the immediate shock but the next day bleeding from the wound continued and she vomited some blood. She made a slow recovery from this condition and was ready to be discharged when a few weeks later she had a sudden severe hæmorrhage from the stomach and passed considerable blood by the bowels. She died on the seventy fourth day after operation.

Prognosis. The mortality of this disease is still high. In a series of 34 personal cases reported by Professor Korte two years ago sixteen patients died giving a mortality of about 47 per cent. In my own series of eight operative cases four cases made a complete recovery and four died. Of the latter one died on the seventy fourth day after operation from a late post-operative hæmorrhage. In general the prognosis will depend upon the severity of the disease the general condition of the patient and particularly the age. One of the most important elements in the prognosis is the early recognition of the disease and the prompt surgical intervention.

METHODS OF APPROACH TO THE PANCREAS

The topographical position of the pancreas is responsible for many of the difficulties in the establishment of a positive diagnosis but a still greater obstacle do we meet when attempting to attack this organ surgically. Nature in her wisdom has concealed this important and vital organ behind and under other organs in the upper cavity of the abdomen thus placing it in a most secure position to protect it against injury and this very fact makes it difficult for the surgeon to attack it and to drain it properly. Generally

CASE 9. S. S. 1 m le age 25 admitted to the Jew Hospital May 1 1913. Patient was married seven years and the mother of two children. Menstrual history negative. One month ago she had an attack of severe epigastric pain with chills and fever. One week before a misson she had another similar attack while asleep. Two days ago patient was awakened from her sleep by an attack of most severe cramps in the epigastrium and right hypochondriac region she vomited constipation was marked. On admission the patient suffered from marked prostra-

speaking there are two ways of exposing the pancreas the retroperitoneal and the retroperitoneal. In the former the abdomen is opened and the pancreas is exposed either through the gastrohepatic omentum or by lifting up the transverse colon and omentum and then perforating the mesocolon. Korte has devised another method. He mobilizes the duodenum after incising the peritoneum and then inserting the finger he can explore the head of the pancreas. The retroperitoneal method consists of an incision in the lumbar region and by going in below the lower pole of the kidney one can explore the tail of the pancreas. This is suitable only in special cases where there is involvement of the tail of the pancreas producing a left subphrenic abscess pointing in the lumbar region. But frequently in addition the abdomen must be opened to provide for proper drainage.

It is thus evident that operation on the pancreas is neither easy nor simple and is attended with considerable danger especially in the possibility of injuring the surrounding organs.

The rational surgical treatment of acute hemorrhagic pancreatitis cannot be better illustrated than by quoting von Mikulicz.

We may consider acute pancreatitis as an acute phlegmon which on account of the peculiar nature of the tissue runs an unusually severe course. As in any ordinary phlegmon so in the pancreas the only rational therapy is to open the focus of infection by multiple puncture and drain the toxic and infectious tissue. Wide gauze tamponade would best control hemorrhage and will best localize and drain this organ.

In my own series of cases the pancreas was approached in all cases but one through the gastrohepatic omentum. Multiple puncture of the pancreas was practiced with rubber tube and gauze drainage through the opening in the lesser omentum. In one case I drained to the left of the ligament of Trietz through the omental bursa.

CONCLUSIONS

A positive diagnosis of acute hemorrhagic pancreatitis cannot be made with absolute certainty since we still lack a distinct pathog-

nomonic sign for this disease. Laboratory aid such as the Cammidge reaction and the Wohlgemuth diastase blood test are of no value in this condition.

A tentative or probable diagnosis can be made in a certain number of cases provided a careful history is obtainable and the various phenomena as they present themselves are properly interpreted.

The most striking feature of this condition clinically is the evidence of peritoneal disturbance in the upper abdomen the so-called acute abdomen which all surgeons agree is an indication for surgical interference and acute hemorrhagic pancreatitis should always be borne in mind in such cases.

When finding the peculiar odorless, sero-sanguineous fluid and the small flecks of fat necrosis it is direct and undoubted evidence of acute hemorrhagic pancreatitis.

The best results are obtained in cases in which operation precedes the stage of necrosis or pus formation. Hence early surgical intervention in all such cases will be rewarded by more frequent recoveries.

The writer's personal observation of the intense cyanosis of the distended small intestine with the peculiar granular or gritty feel of the thickened great omentum has helped him in many cases to recognize the condition at operation and look to the pancreas at once as the cause of the trouble. This is of special value in cases operated upon for supposed intestinal obstruction.

The abdomen opened the condition should be looked for and recognized quickly. Then prompt and efficient drainage should be instituted causing the patient as little shock as is compatible with good surgical technique.

The high median incision is the best one to use because it is the most favorable for exploratory purposes. The lumbar incision has its indications but is only rarely resorted to and then usually in late cases when abscess is pointing in the lumbar region.

Post-operative hemorrhage is not an infrequent cause of death. It is due to necrosis, usually occurring in late cases. Therefore early operation and gentle prophylactic treatment for late complication.

TREATMENT OF ACUTE INFECTIONS

By FREDERICK G. DIAS, M.D., CHICAGO

THE amazing results achieved by heliotherapy in the treatment of tuberculosis both of the surgical and pulmonary type and the scientific demonstration of the fact that certain rays of the sun penetrated the tissues either inhibiting or destroying not only the tubercle bacilli but other pathogenic organisms associated with them as reported by Leuba¹ from the clinic of Rollier led me to undertake some experimental work in the hope that some satisfactory substitute for the rays of the sun might be obtained through some source available at our command. The experimental work was carried on simultaneously at St. Luke's and Cook County hospital. In a review of the literature many conflicting reports were found as to the bactericidal action of the X rays. Much of the work reported by writers on this subject was ten years or more ago. So it was decided to systematically expose the commoner varieties of pathogenic bacteria to the action of the X rays for varying lengths of time with different intensity of current and at varying distances from the tube to determine the behavior of pathogenic bacteria when exposed to the roentgen rays. Kolle and Wassermann give the results of certain experiments as follows:

1. Mink, Wirgin, Blaise and Sambuc found that exposure of cultures of pathogenic organisms to the X ray for forty-eight hours at a distance of twenty millimeters was completely without effect.

2. Reider after twenty to thirty exposures saw inhibition and death of the cholera vibrios and colon bacillus.

3. Frantzius reports inhibition of the *h. a. viru* after one hour's exposure.

4. Clinically it was believed that any good effects were due to the irritating effect upon the tissues and not to any bactericidal action of the X ray.

5. General infections in animals were found to be unfavorably influenced by exposing the animal to the roentgen rays.

6. Tuberculous foci are helped by X ray exposure.

7. Leucocytosis is diminished (Moody).

The following technique was followed in our work.

1. Fresh twenty-four hour cultures of hæmolytic streptococci were plated out on blood agar in Petri dishes. The bacteriologic work was done by Dr. Moody of St. Luke's Hospital and the X ray work by Dr. Van Horn to both of whom I wish to express my thanks and appreciation for their expert help.

2. The Petri dishes were then exposed as follows:

1	18 inches	2 milliamperes minutes
2	18 inches	4 milliamperes minutes
3	18 inches	6 milliamperes minutes
4	18 inches	8 milliamperes minutes
5	18 inches	10 milliamperes minutes
6	18 inches	12 milliamperes minutes
	18 inches	14 milliamperes minutes
8	18 inches	16 milliamperes minutes
9	18 inches	18 milliamperes minutes
10	18 inches	20 milliamperes minutes

Immediately after exposure the Petri dishes were placed in the incubator. Twenty-four hours later the Petri dishes were examined and all were found to have luxuriant growths. There was no difference between the control and the exposed plates.

2. Another series of blood agar plates inoculated with fresh cultures of hæmolytic streptococci was treated as follows:

A medium hard tube was used and the plates exposed at a distance of 24 inches:

1	6 milliamperes minutes
2	30 milliamperes minutes
3	34 milliamperes minutes
4	18 milliamperes minutes
5	0 milliamperes minutes

These plates immediately after exposure were placed in an incubator. Examination 24 hours later revealed a luxuriant growth on all the plates.

The growths on the control and exposed plates were identical.

Plate No. 5 was covered by lead shield with a one inch square hole in the center. This plate although exposed 30 milliamperes minutes showed the best growth in the unprotected area corresponding to the square hole. After 4 hours incubation.

Another series of staphylococcus aureus was exposed. In this group fresh twenty-four hour cultures of the staphylococcus aureus were plated

Organisms	Exposures Milli- amperes Minutes	Control Culture	Exposed Culture
<i>Staphylococcus pyogenes</i> <i>albus</i>		Growth	Growth
<i>Pneumococcus</i>		No growth	Growth
<i>Hemolytic streptococcus</i>		Growth	Growth
<i>Streptococcus mucosus</i>		Growth	Growth
<i>Staphylococcus pyogenes</i> <i>albus</i>	5	Growth	Growth
<i>Pneumococcus</i>	5	Growth	Growth
<i>Streptococcus</i>	5	Growth	Growth
<i>Streptococcus</i>	5	Growth	Growth
<i>Streptococcus mucosus</i>	5	Growth	Growth
<i>Staphylococcus pyogenes</i> <i>albus</i>	10	Growth	Exposed growth
<i>Pneumococcus</i>		Growth	Growth
<i>Hemolytic streptococcus</i>	10	Growth	Growth
<i>Streptococcus mucosus</i>		Growth	Growth
<i>Staphylococcus pyogenes</i> <i>albus</i>	5	Growth	Growth
<i>Pneumococcus</i>	5	No growth	No growth
<i>Hemolytic streptococcus</i>	5	Growth	Growth
<i>Streptococcus mucosus</i>	5	Growth	Growth
<i>Staphylococcus pyogenes</i> <i>albus</i>	20	Growth	Growth
<i>Pneumococcus</i>	20	No growth	No growth
<i>Hemolytic streptococcus</i>	20	Growth	Growth
<i>Streptococcus mucosus</i>	20	Growth	Growth
<i>Staphylococcus pyogenes</i> <i>albus</i>	30	Growth	Growth
<i>Pneumococcus</i>	30	No growth	No growth
<i>Hemolytic streptococcus</i>	30	Growth	Growth
<i>Streptococcus mucosus</i>	30	Growth	Growth
<i>Staphylococcus pyogenes</i> <i>albus</i>	40	Growth	Growth
<i>Pneumococcus</i>	40	No growth	No growth
<i>Hemolytic streptococcus</i>	40	Growth	Slight growth
<i>Streptococcus mucosus</i>	40	Growth	Mod growth
<i>Staphylococcus pyogenes</i> <i>albus</i>	50	Growth	Growth
<i>Pneumococcus</i>	50	No growth	No growth
<i>Hemolytic streptococcus</i>	50	Growth	Slight growth
<i>Streptococcus mucosus</i>	50	Growth	Growth
<i>Staphylococcus pyogenes</i> <i>albus</i>	60	Growth	Growth
<i>Hemolytic streptococcus</i>	60	Growth	No growth
<i>Streptococcus mucosus</i>	60	Growth	Slight growth
<i>Pneumococcus</i>	60	No growth	Growth of con- tamination top. Frig. box.

out on blood agar and the following exposures made to the X rays

A medium hard tube was used and the plates exposed at a distance of 12 inches from the tube

1 15 milliamperes minutes

2 20 milliamperes minutes

3 25 milliamperes minutes

4 30 milliamperes minutes

After 24 hours incubation all these plates showed a luxuriant growth corresponding to the control. There was no difference in the appearance in the exposed and control plates

For the work done at Cook County Hospital I desire to thank Dr James Wilson of the House Staff who spent a great deal of time and labor in obtaining cultures and plating them out and carrying out the bacteriological side of the work and to Dr Blayne for his kind assistance in the X ray exposures

In all these cases a tube of approximately five inches air resistance was used 220 volts no filter in any case

The tube in each instance was placed at a distance of 18 inches from the plate

Cultures were all grown on blood agar plates with controls. The accompanying table gives the results of this work.

It will be readily appreciated from the results obtained in the experiments described that animal tissues could not withstand the reaction from exposure to X rays sufficiently strong to have any effect upon the organisms used and we believe it safe to say that from a clinical standpoint X rays are useless in the treatment of infections except in the case of the tubercle bacillus

In spite of our failure to demonstrate any bactericidal action of the X rays it still seems reasonable to suppose that in certain cases some such action does exist as evidenced by the temporary subsidence of the glandular swellings in Hodgkin's disease which has only recently come within the classification of infectious diseases after treatment with X rays. Furthermore many of us have seen the disappearance of epitheliomata under X ray treatment and we must believe that cancers are infectious

There is little doubt in my mind that every lesion which develops by lymphatic invasion and glandular enlargement will finally be brought into the category of infectious

diseases The leucæmias carcinoma and sarcoma all bear the marks of infections

Many pathogenic microorganisms are killed by exposure to the rays of the sun and it seems reasonable to suppose that when it becomes possible for us to produce some form of rays which will be comparable to the rays of the sun so far as its bactericidal action is concerned then I believe we shall have taken a long step forward in the treatment of infections

CONCLUSIONS

1 The X ray which could be withstood by living tissues has no influence upon pathogenic bacteria

2 Successful results following its use clinically are probably due to the increased hyperæmia and local tissue irritation

3 The failure of the X ray does not prove that some other form of rays or light or radio active substance might not be successful in the treatment of infections

WEAK FEET

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An adequate appreciation of the symptomatology pathology and treatment of foot deformities especially the so-called weak foot is difficult without at least a superficial understanding of the anatomy and physiology the normal relationship of the osseous ligament and muscular structures composing the foot and ankle and the mechanism involved in production of such deformities It must be remembered that while the ankle joint is distinctly ginglymoid it is not strictly diarthrodial as is the shoulder and hip

The osseous segments constituting the so-called outer and inner foot arches are The inner arch composed of (a) the calcaneum (b) the astragalus (c) the scaphoid and (d) the three cuneiform bones The outer arch embracing (a) the outer portion of the calcaneum and (b) the cuboid bone As in other anatomical situations the soft structures are (a) ligament (b) fascial and (c) muscular Among the most important in relation to special deformities are the plantar ligaments and fascia the tendo Achillis and the plantar peroneus longus and gastrocnemius muscles

It has been tritely remarked that the plantar bowstring (fascia muscle ligament) is the weakest and at the same time the strongest portion of the foot Notwithstanding the tremendous force which

through accident or otherwise these structures are sometimes compelled to withstand unlike the apparently stronger tendo Achillis rupture almost never occurs If exposed to prolonged strain however elongation stretching and weakness may ensue On the other hand as a logical result of non use the plantar tissues may become atrophied and shortened and muscular power is correspondingly minimized

Careful study and comparison of ancient and modern orthopedic literature induces the inevitable conclusions that weak foot has markedly increased during the last few years and that it appears to be largely a product of ultracivilization from disturbance of function of the foot and leg muscles entailed by the prevailing fashions in footwear This statement seems reasonable when it is remembered that the ratio of increase in frequency of the deformity is greater in females than in males

While it may be true no definite standard can be established as to what constitutes a normally shaped foot the fact remains that flattening of the plantar arch is usually an evidence of weakness or other abnormality of certain muscles The observation is interesting in this connection however that it has been demonstrated by investigation that in certain races (Indian Negro Japanese) the normal foot appears flat when compared with the high plantar arch of the more civil

lized races yet muscular development strength and functional activity are considerably greater in the former than in the latter. This would indicate that with normal musculature a moderately flat foot need not necessarily be weak, but a more reasonable explanation is that in the red, black, and yellow races the valgus position and the wearing of shoes are not obligatory and when worn they are usually more of the moccasin type; thus muscular development is not impeded by abnormal balance of the body weight as occurs in the fashionable and so-called ultracivilized. The pernicious habit of wearing high-heeled shoes has extended to those of tender years in certain quarters and as a result weak foot has markedly increased among school children. The mechanically disturbed functional relationship between the various foot and leg muscles is believed to be the most important etiological factor in the production of so-called weak foot.

Weakness and pain are the most prominent symptoms, especially when standing or walking for a considerable length of time. Pain is usually noted first in the ankle (or heel) and may radiate toward the calf, thigh, and back. There is marked limitation of normal motion (especially adduction) with a feeling of stiffness in the ankle joint. Muscular spasm may or may not be present. The foot swells after prolonged standing or walking and distention of the superficial veins is commonly observed.

While the diagnosis is not difficult in typical cases, the fact must be constantly borne in mind that there may be normally a low inner arch with more or less discomfort upon standing or walking yet without muscular weakness, abduction or marked limitation of normal motion. This type of practically normal foot has been particularly noted in certain races as already stated. In such instances there may be some confusion in the diagnosis. When lowering of the inner arch is not pathological, relief from discomfort may usually be obtained by rest without mechanical or other treatment.

The essential pathology in typical weak foot is an abnormal relaxation or stretching of the plantar tissues, thus permitting descent

of the inner arch. The ligamental and muscular structures which should normally maintain the astragalus, scaphoid, and cuneiform bones in correct apposition in lesser degree also participate in the pathological process and contribute toward the production of deformity. The tendo Achillis is abnormally shortened from habitual elevation of the heel, and the gastrocnemius becomes atrophied from non-use. In long-standing cases, owing to the changed condition, the foot may become fixed in exaggerated abduction, resulting in the so-called rigid foot described by previous authors. The unused portions of the articular surfaces may become denuded of cartilage, and new facets may be formed to accommodate the changed osseous relations. The periosteum at certain points may show evidence of injury from the effect of increased pressure.

Nearly every orthopedist adopts a different method of treatment. For instance, some use braces only, some use exercise only, while others use both braces and exercise. I believe the special type of deformity is suggestive of the proper treatment. For example, an aggravated painful rigidly abducted foot, regardless of the age of the patient, should be thoroughly stretched by force under anesthesia into a position of adduction at least to right angles and if possible into slight dorsiflexion and held with plaster dressing for at least two weeks, after which an impression is taken with the foot held in a normal attitude from which a brace is made after the method described by Whitman. (In this class of cases a brace is required; do not consider a plate as a brace.) It is necessary to hold the foot in the corrected position for at least one year. We should never regard a brace as a corrective agent in these deformities; it is only expected to hold the foot in the corrected position and prevent recurrence of the deformity.

The attitude or the proper body balance is the first point to be accomplished; then of equal imperative importance is the development of the muscles in their proper supportive channels by massage and active properly directed in the main.

stances however this will not prove satisfactory unless the patient has been thoroughly drilled as to the exact kind of exercise to be taken. Advice alone is not sufficient; you must have a class in charge of a competent director. It is necessary to have regular and systematic active motion in every case of weak foot regardless of the degree or type. It is impossible to obtain the desired result so long as the patient wears improper and ill fitting shoes. The shoes should be built to allow the foot to acquire the normal attitude. Many beginning cases of weak foot can be permanently relieved by modification of the shoes to cause an internal elevation of the heel, throwing the body weight to the outer border of the foot.

While my remarks are directed to the correction of pathological conditions, it is always more important to prevent the occurrence of foot weakness. This could be done in nearly every instance if the patient were taught the necessity of properly balancing the body weight upon the feet and would not wear shoes that interfered with normal muscular function and bony relationship. We are getting too far from nature. Shoes should be worn that suit the feet and not the eye. With the exception of weak foot resulting from trauma, infectious arthritis and paralysis (which will not exceed 5 per cent) this deformity is unnecessary and preventable.

In practically all cases where a weak foot is not rigid a cure can be effected by strapping the foot every five days in the attitude of adduction at right angles, the application of proper shoes and active exercise. The time required for a cure varies according to the degree of advancement and the cooperation of the patient.

Weakness of the anterior metatarsal arch, which was first recognized and described by Morton of Philadelphia and familiarly known as the Morton toe, results from weakness or depression of the anterior metatarsal arch as a whole or in part. He claimed the affection was a neuralgia caused by com-

pression of the plantar nerves. Anterior metatarsalgia has been suggested by various authors as a more distinctive term. In practically every case this type of deformity is produced by improper shoes. It occurs more frequently in women as their shoes have narrow soles and high heels which throw the foot in position to cause contracture of the common extensors. This condition may become so exaggerated that it may be necessary to transplant the common extensor tendons into the neck of the metatarsal bones or to remove completely the point of greatest pressure which is found beneath the head of the metatarsal bone. Gibney recommends the institution of a high arch and low heel in order to remove part of the pressure from the heads of the metatarsal bones. Forcible plantar flexion and adduction under anaesthesia, the foot being held in this position about two weeks, has proved beneficial in some cases. I do not believe there is any condition of the foot that will produce more trouble and pain and prove more difficult to relieve permanently than anterior metatarsalgia.

CONCLUSIONS

- 1 Weak foot occurs more frequently in females than in males and in the majority of instances is caused by the wearing of improper shoes.

- 2 The most reliable diagnostic symptom is pain when standing or walking which is relieved by rest.

- 3 As a prophylactic measure normal individuals should be taught to walk with the feet parallel.

- 4 Abducted feet should be forced to acquire a normal attitude by a fulcrum at the calcaneo-astragaloid joint.

- 5 All weak feet are amenable to treatment by mechanical or operative measures and proper exercise with application of appropriate shoes.

- 6 All mechanical support should be withdrawn as soon as muscular power has been sufficiently developed.

THE SILENCE OF RENAL TUBERCULOSIS¹

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WE are taught that pain is one of the most constant of the five cardinal symptoms of inflammation consequently pain in the kidney is one of the first things inquired for when tuberculosis of that organ is suspected. If there is no pain and never has been we seek to elicit it by pressure. If there is no pain on pressure we conclude there is no renal inflammation. Yet this conclusion is often unwarranted: there are cases of renal tuberculosis which run their whole course without localizing pain or even an ache in the small of the back. These we term silent as they utter no word implicating the kidney and leave us to spell out the condition in other ways.

If we consider the causes of renal pain intrinsic to tuberculosis of the kidney we can better understand why some of these patients have acute renal colic, an intermittent pain or ache in the loin, or a constant pain or ache while others as in the four cases reported to night never have pain in the renal region at any time.

Innervation. Innervation of the renal parenchyma is from the sympathetic system traceable from the renal plexus along the vessels of the kidney through the hilum and is lost in the cortex itself. A branch supplies the ureter and another branch supplies the ovary or testis. The nerves of the capsule do not seem to have been demonstrated. The adjacent somatic nerves which may be affected by pressure on them from ballooning of the kidney or ureter or by spread of the inflammation to them are the last dorsal, the iliohypogastric, the inguinal genitocrural and the external cutaneous.

The kidney itself is almost if not quite insensitive to contact or pressure. In Bright's disease the parenchyma may be congested in places and fibrous in others without pain. Pain is not an essential accompaniment of inflammation of the parenchyma. On the other hand distention of the kidney from within is agonizing in effect. The classic picture

of renal colic is produced by suddenly damming back a continuous flow of urine by a stone in the ureter. This pain may come from squeezing the parenchyma against the capsule whence it might radiate down the ureter or to the testis but also it may come from stretching the capsule itself or from pressure of the distended kidney or ureter on adjacent nerve trunks, whence it might radiate to the dartos, cremasteric, etc. Sudden violent distention of the ureter or capsule is necessary to produce colic. Tying the ureter apparently gradually inhibits the excretion of urine and as there is no violent distention no colic follows this procedure. The obstacle which produces colic must allow of slight leakage of intermittency of flow or of movement onward sufficient to encourage the kidney to keep on functioning or sudden violent distention and consequent pain does not occur. The spasmodic character of this pain is probably due to change in pressure with peristalsis. When excretion of urine stops pain ceases up when the urine is absorbed pain from this cause ceases.

The obstruction in early tuberculosis of the kidney is usually a blood clot from an eroded vessel later on in the disease it may be a blood-clot caseous material gravel (if a gravel forming infection is superadded) stricture of the ureter or sudden occlusion of the ureter by linking. The suddenness of distention and its extent determine the degree of pain. It may be all the way from typical colic down to an intermittent dull ache. If distention is very gradual there may be only a weak back or no pain at all as in Case D: 12 3 14 while in cases with no obstruction to the free flow of urine pain in the kidney is not to be expected at all unless from the spread of the disease to adjacent structures and this is very rare when there is no distention. Finally when we consider that the renal tubules calyces pelvis and ureter not only form an escape for inflammatory products, but also constitute a flushing system in which the

urine acts not only as a diluent of blood pus, and caseous material but also washes them out through comparatively large conduits it seems remarkable not that pain in the kidney is often absent but that it is present in the majority of cases

If then renal tuberculosis sometimes gives no localizing symptoms what is to lead one to suspect its presence and how is diagnosis to be made in silent cases?

Tuberculosis of the kidney should be thought of—

1 When a patient presents himself for loss of weight and strength when no other cause can be found if there are pus-cells in the urine

2 When he presents himself for hæmaturia and finally

3 When he consults us for cystitis for although tuberculosis of the kidney may give no symptoms tuberculosis of the bladder secondary to renal tuberculosis practically always speaks out and in advanced cases speaks out very loudly

Diagnosis There are always pus-cells in the urine. If the case is one of hæmaturia the leucocytes may be masked by the large numbers of red cells but after the bleeding has stopped the pus-cells will be found. The only possibility of the pus cells being absent occurs when the tubules or ureter through which they come is blocked. One must be on guard if the urine is alkaline then the pus cells may lake on standing and for this reason all urine should be inspected microscopically as soon as possible after it is voided. It is my custom always to have the specimen passed in the office not brought in a bottle.

Pus being present in the voided urine it can be demonstrated that it comes from a source above the urethra by the two-glass test or by catheterization. Pus in the second glass or in the last of the flow through a catheter is presumptive evidence of a seat of inflammation in the upper urinary tract.

This inflammation may be caused by one or many of the pathologic micro organisms. For the most part they get along very well together. The gonococci and staphylococci are perhaps most frequently associated the colon bacillus and the proteus bacillus more

frequently are solitary invaders, but any of them may be found with the tubercle bacillus. Generally the tubercle bacillus is alone at first and cultures will therefore be sterile. Beware a pyuria sterile to culture! And on the other hand do not consider a cystitis non tubercular because other microorganisms are present.

After pus has been found stain for tubercle bacillus. If they cannot be found it does not follow that they are not at the root of the condition. Some claim that they can be demonstrated in 60 per cent or 90 per cent of cases. This percentage is altogether too high an attainment for most of us to achieve.

If tubercle bacillus cannot be found in the urine lose no time with the von Pirquet or Moro tests. If the temperature is normal inject $\frac{1}{4}$ mg of old tuberculin hypodermically and increase the dose if no reaction follows. If no reaction follows 2 mg we may take it for granted there is no tuberculosis. Culture the urine. If it is sterile or if old tuberculin gives a reaction seek anew for tubercle bacillus in the urine and if again unsuccessful use the guinea-pig test. If this is negative even if the old tuberculin test is positive we have excluded tuberculosis of the urinary tract as nearly as possible. The only chance of error is that the focus is sealed so that no bacilli get into the urine. There are two other simple tests which may be tried for what they are worth. In tuberculosis the bladder is said to be extremely intolerant of silver nitrate irrigations and when this salt is very badly borne it is suggestive. The second test is made by pressure on the ureter through the vagina or rectum. If renal tuberculosis is present a referred pain is felt in the kidney region. If tuberculosis of the urinary tract is present its main focus and extent in silent cases must be made out by means of the cystoscope or by exploratory operations over both kidneys. This latter course is inexcusable when ureteral catheters can be passed but advisable when they cannot. If this routine is followed fewer cases of renal tuberculosis will reach the surgeon at a stage when interference is hopeless.

In my small list of cases there are several which have had periods of rest from renal pain for years at a time but that four on the list

were always silent shows how large a percentage of tubercular cases may be overlooked unless special attention be paid to all cases which may possibly have renal tuberculosis. Of these four cases three ended fatally. One of these three is recalled with self-condemnation another was associated with errors on the part of my confrères and the last died three days after she was first seen. The fourth case was diagnosed early and the prognosis following operation is very good indeed.

CASE G 12 1 12 This patient was a ground man of the British Columbia Electric Railway Company. For one year he had risen at night to urinate. When first seen he had passed urine every hour or two night and day. There was urgency and pain in the glans penis on holding his urine. There was pus in the urine and tubercle bacilli in large numbers from both kidneys, but the condition was much worse in the right kidney and from this side there was only a trace of urea. There was no pain over either kidney and subsequently the bladder and prostate were opened and after that abscesses in the perineum were drained by surgical confrères who presumably were unaware of the ureteral findings. The case terminated fatally in six months.

CASE D 12 3 14 An Italian laborer was sent to consult me in March 1912. He had a very contracted and chronically inflamed bladder with extension of infection to the posterior urethra prostate vesicles, and left epididymis. He attributed the beginning of his illness to an attack of gonorrhoea contracted three years before and when no tubercle bacilli but only staphylococcus aureus was found in the urine the condition certainly looked like a venereal legacy. Ureteral catheterization was found impossible but there had never been any pain over either kidney and so nearly comfortable on pressure were both kidneys that the note slight tenderness over right kidney was followed by a question mark. Von Pirquet's test was negative. In the course of the next few months the bladder was drained suprapubically the left testicle was removed abscesses in the perineum and in the left seminal vesicle were drained. Post mortem showed the left kidney to be nothing but a huge tubercular sac plastered high up on the diaphragm. The right kidney which had been questionably tender was congested only.

CASE I 13 3 14 Mrs. I 34 years mother of four sturdy children. Except for malaria ten years ago and for symptomless hæmaturia seven years ago she was always well and strong. Her three months illness dates back to when she first began to have frequency of urination and pain before and for a few minutes after voiding urine. No renal pain.

The vesical symptoms increased in severity. When first seen she had the appearance of being severely septic. On examination her bladder capacity was 120 ccm. There was diffuse cystitis. The left ureteral orifice was set in a honeycombed hemorrhagic areæ. The right ureteral orifice was more normal in appearance. The urine from both ureters was heavy with pus and contained many tubercle bacilli. The urea content was about the same from each side and was much below normal. She died three days after I first saw her.

CASE L 14 7 6 A Norwegian laborer 27 years old was referred to me after three weeks treatment for cystitis coli: the symptoms of which were discomfort in the perineum frequency of urination night and day with urgency even to incontinence on holding urine and an occasional trace of blood at the meatus after urination. There were no symptoms of any derangement of the sexual organs. The urine contained pus-cells throughout but culture was negative. No tubercle bacilli could be found on repeated examination and the family and personal histories were against tubercular infection. He had never had any venereal disease. On cystoscopy the bladder wall was found generally congested, most markedly about the left ureteral orifice. There were no typical tubercular ulcerations. The pus-cells in the urine came through from the left ureter only.

During this illness he had no elevation of temperature and no discomfort whatever over the kidneys and there was no tenderness even on palpation. One half milligram old tuberculin was injected and the temperature rose over one degree and there was local reaction as well. This was repeated with a like result. After renewed attention to the urine tubercle bacilli were found. A sclerosed left kidney contains pockets of pus and the ureter were removed. There is still a sinus leading to the kidney pocket and two ecchymotic spots to be seen in the bladder but he is holding his urine for increasingly longer periods without discomfort and he is gaining in weight and strength.

In conclusion let me sum up and make additions to the main point of this paper as follows:

- 1 Renal tuberculosis gives no local symptoms in a large percentage of cases.
- 2 Its first manifestation may be hæmaturia or symptoms of its spread to the bladder.
- 3 A history of gonorrhoea or the finding of colon bacillus staphylococci or other pathological microorganisms in the urine in no way excludes the concurrent presence of tubercle bacilli. In fact renal tuberculosis predisposes the urinary tract to other infections and the tubercle bacillus is reinforced by such allies before it reaches its invasion.

4 The importance of early diagnosis of tuberculosis is fully recognized when the lungs are involved. It should be as fully recognized when its main focus is in the kidney

for it is usually unilateral at first when the whole focus can be removed and the patient cured but in time may become bilateral or bilateral when the case is hopeless

DERMOIDS OF THE KIDNEY

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WORKS on diseases of the kidney quite uniformly state that only two cases of dermoid of the kidney are on record and with unanimity they refer to the celebrated case of Sir James Paget¹ and to the case reported by Professor Haeckel² in 1902. Investigation however shows that a few other cases are to be found in the literature. Paget's case was one of dermoid tumor of the kidney in the sheep. It seems strange that this error went so long without being discovered but it was finally pointed out in 1913 by W. R. Williams³. The discovery was easily made as the specimen in the museum of the Royal College of Surgeons is described⁴ as follows:

3558-A. A large tough walled cyst probably dermoid which was found in the place of one of the kidneys of a sheep and contained a mass of wool rolled up with fluid oil and fatty matter. The cyst is inverted its walls are from one to two lines in thickness its inner surface is rough and covered with portions of fatty substance and part of the wool is fixed in it. A long cylindrical tubular process is continued from the main cyst and is similarly filled. The cyst was found in the middle of the mass of fat in which it was expected that the kidney lay. No trace of kidney appeared. The sheep was healthy and very fat and had a good fleece. The kidney on the other side was very large.

CASE 1. Haeckel's case referred to above was reported in full by his assistant Wedemann in his inaugural dissertation.⁵ Female aged 58. Had noticed some sort of swelling in the right side for several years, but only for a few months had it made itself prominent with increased pain. A distinct tumor. No urinary trouble. Menopause

Surgical Pathology London 853

Reichlin Wechsungen 1902 xxix 964

Lancet, London 1, 96

Descriptive Catalogue Pathological Specimens in the Museum of the Royal College of Surgeons of England, London 1885 iv 5

June, 1902

at 37. A hard tumor about the size of a child's head in the iliocecal region smooth and globular very movable but it appeared to be fixed near the anterior superior spine. No involvement of lumbar region. No connection with the liver or genital organs. Operation November 25th 1901. Incision at the outer border of the right rectus. Tumor easily removed with prompt recovery of the patient. The tumor was cystic its surface nodular in places filled with a pulsatious yellow substance traversed with bundles of hair.

CASE 2 (Reported by W. S. Goldsmith⁶). The patient was a male, aged 20. Had had evidence of trouble with one kidney since two years of age. Frequent attacks of colic. The tumor had been recognized for two years. Hematuria and great pain were pronounced features. The diagnosis was that of floating kidney with twisted pedicle. Kidney removed through a lumbar incision. Prompt recovery. Examination of the tumor showed kidney remains to be present but the main mass was made up of a cyst containing a large quantity of reddish cheesy material matted together by hair.

CASE 3 (Reported by E. W. Walker⁷). Girl aged 11 years. Had been subject to attacks of so called colic for several years. The attacks would last several days and were attended by nausea vomiting constipation tympanites and irritable bladder. Pain located in the left lumbar region and tumor noticed for about one year in this region. No positive diagnosis made. Exploratory laparotomy July 15 1895. Median incision four inches in length. The tumor was found to be the size of a large orange. Had a long slender twisted pedicle and had contracted light intestinal adhesions. Removal very simple. Prompt recovery. Examination of the tumor showed that it was 4½ inches long 2½ inches wide and 1½ inches thick. Two thirds of this was taken up by a cyst. There seemed to be three dermoid cysts one of which was filled with fatty material and fine hair.

CASE 4 (Reported by Schlegelendal B. and Madelung⁸). Male aged 22. Had had a swelling in the right side of the abdomen as long as he could

T. Southern Surg. & Gynec. Ass. 1908 ix 91

Ty. Am. Surg. Ass. 1897 379

Arch. f. klin. Chir. 1887 xxvii 304

remember but this gave no trouble until six months before. The tumor was in the right upper abdomen, was quite extensive and apparently connected with the liver. Diagnosis Echinococcus of liver. At the operation two incisions were made and the cyst opened and attached to the skin for drainage. About a bucketful of clear yellow fluid was withdrawn but this contained neither hydatid vesicles nor hooklets. Patient improved for a few weeks but then got worse and died some months later. At the autopsy the liver occupied the greater extent of the abdomen. Marked amyloid degeneration. Spleen much enlarged and adherent. In the place of the right kidney was a long tumor a portion of which extended to the abdominal wall where a fistula peristed. The greater part of the tumor was of stony hardness so that it had to be cut with a saw. Cystic spaces were present filled with a whitish smeary mass consisting of fine fat cells crystals of cholesterol and epidermis. Renal parenchyma could be made out at various parts and epidermal tissue was scattered throughout the calcified strata.

CASE 5 (Reported by Enrico Boni¹) Female aged 45. Had had symptoms dating back about 15 years. Swelling noticed for ten years in the right side of the abdomen. Globular tumor present extending from costal arch along the median line to the crest of the ilium. Not moved by inspiration. Indistinctly lobular. Not connected with the liver. Diagnosis: Hydronephrosis probably due to calculus. Operation May 16, 1904. Incision at border of right rectus. Tumor removed a usual with a large gauze drain left in the wound. Patient died four days later. The tumor the size of an adult head contained five intercommunicating cysts, filled with yellowish green turbid fluid and detritus. The tumor showed typical structure of skin with sebaceous sweat glands, hair follicles, and hair scattered throughout the several sections.

(A. G. Rider¹ published a report of a case of alleged dermoid cyst of the kidney with malignant degeneration. In the report of the autopsy however it is impossible to find anything pointing to a dermoid, and the tissue sent to the Clinical Research Society was reported as a columnar celled carcinoma. The tumor was removed by operation but the wound gave way with prolapse of the bowel and death of the patient.)

AUTHOR'S CASE Miss M H Degraff Ohio
Physician Dr J H Wolfe April 30 1912 Age 6

Over. max. Mine 1906 1,300
Lancet. Load 1906 is 500

Patient was seen rather hurriedly at the office of her physician. Appetite fair, bowels regular, kidneys normal, menstruation regular and normal. The mother stated that her daughter had had an abdominal tumor ever since she was a year or two old. When first discovered it was about the size of a hen's egg. Had grown with the growth of the child, but of late had been growing more rapidly. The patient was a hearty looking schoolgirl. She presented a tumor about the size of a cocoonist in the right side of the abdomen. This could be pushed freely in all directions. Because of her youth made no vaginal examination but from the mobility of the tumor and the history of its long existence made a presumptive diagnosis of an ovarian dermoid though the tumor was rather large for a growth of that character. Its prompt removal was advised.

I saw her next June 7 1914 and examined her without removing her clothing. The tumor was about as before except somewhat larger but still quite movable. Urged operation.

Operation August 4 1914 Grant Hospital Dr
Wolfe being present. Examination under the
anesthetic showed that the tumor was not of pelvic
origin. Its range of motion seemed to indicate that
it was of the kidney and not of the ovary. It was
hard in general but irregularly so feeling somewhat
like a hydrocephalic head. Made an incision directly
over the tumor which was found to be retroper-
itoneal and to involve the kidney. A transperitoneal
nephrectomy was made without difficulty. Pelvic
organs normal. Appendix removed. To provide
for any possible oozing from the large surface which
was exposed a cigarette drain was passed through a
stab incision to be removed in a few hours. The
colon was then carefully replaced and the incision
closed without other drainage. Patient made as
usual recovery.

Examination of the tumor before its removal showed that it involved the lower half of the kidney. The other half projected from the tumor and was apparently normal. Studied the specimen for a few moments to see if this much of the kidney could be saved but finally decided against it and the whole organ was removed and turned over to the pathologist. His report showed that it was a carcinoma of the kidney involving the lower half. The walls of the tumor consisted largely of bony plates while the interior had many cavities containing different colored fluids filled with cholesterol crystals. No hair.

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I do not know of any abdominal operation that is more satisfactorily accomplished and accompanied with less disturbance to the patient. I believe it is always indicated where conditions exist which would not admit of the administration of ether or chloroform. In the last two years I have used only novocaine 1:200. Infiltration of the abdominal wall alone was necessary in a few

remember but this gave no trouble until six months before. The tumor was in the right upper abdomen was quite extensive and apparently connected with the liver. Diagnosis Echinococcus of liver. At the operation two incisions were made and the cyst opened and attached to the skin for drainage. About a bucketful of clear yellow fluid was with drawn, but this contained neither hydatid vesicles nor hooklets. Patient improved for a few weeks but then got worse and died some months later. At the autopsy the liver occupied the greater extent of the abdomen. Marked amyloid degeneration. Spleen much enlarged and adherent. In the place of the right kidney was a long tumor a portion of which extended to the abdominal wall where a fistula perforated. The greater part of the tumor was of stony hardness so that it had to be cut with a saw. Cystic spaces were present filled with a whitish creamy mass consisting of fine fat cells crystals of cholesterolin and epidermis. Renal parenchyma could be made out at various parts and epidermal tissue was scattered throughout the calcified strata.

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AUTHOR'S CASE Miss M. H. Degraff Ohio
Physician Dr. J. H. Wolfe April 3 1912 Age 16

Opp. Wagon M. House 1906 380
Lancet Lond 1906 380

Patient was seen rather hurriedly at the office of her physician. Appetite fair, bowels regular, kidneys normal, menstruation regular and normal. The mother stated that her daughter had had an abdominal tumor ever since she was a year or two old. When first discovered it was about the size of a hen's egg. Had grown with the growth of the child, but of late had been growing more rapidly. The patient was a hearty looking schoolgirl. She presented a tumor about the size of a coconut in the right side of the abdomen. This could be pushed freely in all directions. Because of her youth made no vaginal examination but from the mobility of the tumor and the history of its long existence made a presumptive diagnosis of an ovarian dermoid though the tumor was rather large for a growth of that character. Its prompt removal was advised.

I saw her next June 7 1914 and examined her without removing her clothing. The tumor was about as before except somewhat larger but still quite movable. Urged operation.

Operation August 4 1914 Grant Hospital, Dr. Wolfe being present. Examination under the anesthetic showed that the tumor was not of pelvic origin. Its range of motion seemed to indicate that it was of the kidney and not of the ovary. It was hard in general but irregularly so feeling somewhat like a hydrocephalic head. Made an incision directly over the tumor which was found to be retroperitoneal and to involve the kidney. A transperitoneal nephrectomy was made without difficulty. Pelvic organs normal. Appendix removed. To provide for any possible oozing from the large surface which was exposed a cigarette drain was passed through the stab incision to be removed in a few hours. The colon was then carefully replaced and the incision closed without other drainage. Patient made an ideal recovery.

Examination of the tumor before its removal showed that it involved the lower half of the kidney. The other half projected from the tumor and was apparently normal. Studied the specimen for a few moments but finally decided against it and the whole organ was removed and turned over to the pathologist. His report showed that it was a dermoid of the kidney involving the lower half. The walls of the tumor consisted largely of bony plates while the interior had many cavities containing different colored fluids filled with cholesterol crystals. No hair.

bowel movements, which soon became painful. These small frequent movements were no doubt the direct result of the formation of the inflammatory stricture. The stool was arrested at the site of the stricture, a proctitis developed, and the resulting mucus would soften a little of the stool which would be passed at frequent intervals, together with the mucus, and accompanied by considerable straining. The man's general condition was not good. He had extensive *emphysema chronic bronchitis*, an enlarged heart with systolic murmur at the apex, marked arteriosclerosis, and he was somewhat cyanotic and dyspnoeic. The general abdominal examination was negative. Cystoscopy showed a moderate prostatic enlargement, normal urethral orifices and no new growth in the bladder. A radiographic picture of the pelvis showed nothing abnormal. The Wassermann reaction was negative. On rectal examination five inches from the anus, a hard circular infiltration was felt. It was smooth and regular, did not bleed readily but would not admit the tip of the index finger. The tip of the smallest bougie could not be passed through the stricture. All rectal manipulation, probably due to the proctitis was very painful. There was no rise in temperature. So we had to deal with a man of 63 in poor general condition with tight inflammatory stricture of the rectum rather high up which would not admit the tip of the finger or the smallest bougie. Moreover all rectal manipulation was very painful and the patient threatened to leave the hospital unless he could be treated without pain. The stricture was too high up to make linear incisions; any attempt at instrumental dilatation would probably have resulted in perforating the rectum and an external proctotomy, with resection of the coccyx would have been far too venous an operation for this debilitated old man. We finally decided to open the abdomen and be guided in our operative procedure by the pathological condition present. Operation July 20, 1914. The abdomen was opened through a left rectus incision. A Wales bougie was inserted by an assistant and found to be obstructed about five inches from the anus. Repeated attempts were made to pass the bougie through the stricture, but they failed. At the site of the stricture a white scar about one inch wide was seen, completely encircling the bowel. I then requested the assistant to use considerable upward pressure on the bougie which I had made to engage in the stricture by manipulation from inside of the abdomen. We tried this with bougies of various sizes but were unable to pass a y bougie into or through the strictured area. It then occurred to me that by forcing the bow

toward the anus from within the abdomen while the assistant steadied the bougie from outside the anus, I might be able to overcome the stricture. I was a little afraid that I might perforate the bowel at the seat of the stricture but that would have been no more serious than an incision at that point. Without using excessive effort after a few minutes of manipulation, I could feel and see the strictured area begin to dilate and I soon had the satisfaction of feeling the tip of the bougie in the bowel above the stricture. With a little patience a small bougie was soon passed through the stricture, or rather the rectum was milked over the bougie at the site of the stricture. Larger bougies were then passed and the bowel milked over them in like manner until the largest Wales bougie lay in the rectum above the former stricture. The bougie was allowed to remain in place and the abdomen was closed without drainage. Eighteen hours after operation the bougie was removed on account of pain. Convalescence was uninterrupted, the wound healed by primary union and at the patient's request he left for his home one week after operation.

The man was requested to return every few weeks to have bougies passed. This he neglected to do, and we did not see him for over two months. In spite of this we were able to readily pass bougies high up into the rectum although there was slight narrowing at the site of the former stricture. On November 10, 1914, I examined the patient after he had had no bougie passed for a month. Without any difficulty I was able to pass the largest Wales bougie. The bowels moved readily without undue effort and without cathartics or enemata.

We believe we are justified in looking upon this new procedure as a valuable addition to the other procedures for overcoming inflammatory strictures of the rectum and sigmoid flexure. The operation is applicable to all such strictures more than three or four inches from the anus. Its advantages are:

1. Ease and certainty the work is all done under guidance of the eye.
2. Absence of shock.
3. Rapid recovery the stay at the hospital need not be much more than a week.
4. Little or no danger of perforating the rectum.

A NEW OPERATION FOR STRICTURE OF THE RECTUM OR SIGMOID¹

B. JOSEPH WINNER, M.D., New York

Assistant Surgeon Mount Sinai Hospital

STRICTURE of the rectum is either congenital, traumatic, tubercular, dysenteric, gonorrheal, syphilitic or neoplastic. Under traumatic strictures are included those caused by cinemata. With the exception of the congenital and neoplastic, they may all be included under the general term of inflammatory. Regarding the location of the stricture, Perret reports fifty-six cases. In four it was at the anus, in thirty two less than 6 cm. from the anus, in three at 6 cm. in seven from 6 to 9 cm. in five more than 9 cm. in five at the rectosigmoid junction.

The methods of treatment hitherto employed were

1. *Dilatation* Beach in Cooke's Treatise on Diseases of the Rectum and Anus, 1914 warns against the use of sounds and bougies to determine the site and degree of occlusion and also states that great care must be exercised in using these instruments for treatment to avoid serious damage to the bowel which would aggravate the pathology besides introducing other complications.

This may result in perforation and peritonitis. In a similar vein Tuttle states that exploratory laparotomy is less dangerous than any instrumental examination of the rectum in diseased conditions if the use of the pneumatic proctoscope be excepted. He further warns against the danger of introducing rectal instruments into patients under the influence of anesthetics; the only guide there is in regard to the amount of traumatism that is being produced lies in the sensations of the patient and one may perforate the intestine unconsciously if this safeguard is removed. The writer has personal knowledge of three cases of perforation of the rectum due to the passing of instruments under anesthesia. The cases were in the hands of three different competent surgeons; in each one the injury was at once recognized and the abdomen opened for its repair. One of the cases recovered promptly, the second only after a prolonged wound infection and the third died as the result of a perforative peritonitis. Undoubtedly these cases are more common than is generally known as the surgeon to whom this unfortunate accident happens is not very prone to publish his experience. And it was in some measure due to the knowledge of the three cases just referred to that

the writer devised the operation which forms the basis of this paper. In anal stricture multiple incisions may be made followed by gradual dilatation every few days. If the stricture is below the peritoneal reflection forcible dilatation under anesthesia may sometimes be attempted although there is danger connected with this procedure. If the stricture is above the level of the levator ani gradual dilatation may be attempted with sounds or Wales bougies without anesthesia, provided the stricture is not so tight that it will readily admit the smaller bougie.

2. *Linear incisions with rapid dilatation* This is applicable only to strictures near the anus, and may result in incontinence.

3. *External proctotomy* The incision is similar to the Rydygier-Rehn for resection of the rectum. The coccyx is removed, the stricture divided by a posterior longitudinal incision supplemented by bougie treatment. The disadvantages of this operation are (a) danger of fistula at the point of incision (b) the wound takes many weeks or even months to heal (c) permanent local weakness and lack of support due to the defect of bone.

4. *Rectoplasty* This consists of a longitudinal incision with transverse suture on the order of the Heinecke-Mikulicz pyloroplasty. It is applicable only to valve-like strictures, chiefly of congenital origin and can be carried out only down in the rectum.

5. *Excision* This is rarely necessary and is much too severe and dangerous an operation with a mortality of almost 25 per cent.

6. *Colostomy* This is indicated in extensive ulceration and stricture due chiefly to lues.

7. *Lateral anastomosis* (sigmoidoproctostomy) for very high strictures imbedded in extensive adhesions.

None of the above seven methods of operating seemed the ideal procedure in the following case.

Samuel R., 63 years old came under the writer's care at Mount Sinai Hospital, July 5, 1914. He complained of gradually increasing pains for the past 15 years; he had reducible inguinal hernia for fourteen years and he had been operated on for vesical calculus 3 times before. Four months before admission, after becoming constipated he had resorted to hot enemata one of which produced severe burn in the rectum. A few weeks later he noticed an ill frequent

A NEW METHOD OF LATERAL (SIDE-TO-SIDE) INTESTINAL ANASTOMOSIS

BY A. L. SORESI, M. D. NEW YORK

THE purpose of the new method of lateral intestinal anastomosis described in this paper is to remedy the objectionable features common to the older methods first by shortening the time required to do the anastomosis reducing the period about one-half second by avoiding the formation of two useless and at times dangerous cul-de-sacs and third and most important of all by forming an anastomotic opening which has no tendency to become occluded and which because of its shape and size is better suited for the passage of the intestinal contents than the opening obtained by the older methods. The technique is as follows:

After the usual preparation of the intestines the two stumps which are to be anastomosed are brought in contact the cut edges in opposite directions (Fig. 1). A strand of any suture material preferably silk about 40 cm long on which two round needles have been threaded (the choice of the needles depends on the operator—the author always uses plain seamstress needles No. 7) is used for a seroserous suture in the following manner. The suture is started midway between the two cut edges of the intestine about 2 mm from the attachment of the mesentery. One of the two needles is used to start the suture and the stitches are taken toward one of the cut edges up to a distance of approximately 3 mm from the same.

A like procedure is followed with the other needle in the opposite direction. The two ends of the thread are gently pulled apart but are held parallel with the suture line to insure a perfect approximation of the serous surfaces. The ends are dropped temporarily and will be used later. With a pair of scissors the two stumps of the intestines are cut longitudinally and parallel to the seroserous suture approximately 3 mm from it. Two needles are threaded with one strand of chromic or iodized catgut No. 1. A suture intersecting the three coats is started just about opposite the point of the beginning of the seroserous suture and is continued completely around half way with each needle until the intestine is completely closed. The two ends of the catgut are then tied with two knots—the first one being a surgical one—and the catgut is cut short. The two needles which had been used to start the seroserous suture are picked up and the two ends

of the silk again pulled gently as described above. The suture is continued half way with each needle until the two needles meet when the thread is tied and cut close.

The author strongly recommends the use of catgut for the through and through suture because unabsorbable material might be the nucleus for the formation of calculi which in time might even occlude the lumen of the gut—a fact demonstrated by the author in another paper.

As is readily seen from the illustrations the completed anastomosis appears more like an end-to-end than a side-to-side anastomosis. The opening between the stumps is very large—in fact larger than the normal lumen of the intestines that have been anastomosed—and the intestinal contents follow a normal course without detour. By examining the illustrations we also see that the opening between the stumps is different from the opening obtained in other methods of anastomosis. The original natural size and shape of the lumen are preserved for where the stumps come together they are united in a slanting way so that each forms half of the larger new lumen without altering the lumen where the anastomosis begins in each stump of the intestine. By this arrangement the possible retraction and following constriction caused by scar tissue could not affect in any sensible way the lumen of the anastomosis. In other words the anastomosis is made by overlapping the two stumps of the intestine which have been cut wide open doubling the size of the gut at the point of the anastomosis so that any probable constriction could not cause any appreciable narrowing of the new lumen of the intestine. The author would call attention to the fact that the illustrations are exact reproductions of the specimens and portray the operation step by step. The photographs have not been even slightly retouched.

The illustrations show so plainly the different steps of the anastomosis that any surgeon should be able to master the technique. It should be strongly advised however that the procedure be tried first on the cadaver or better on living animals for before attempting the operation on a patient the surgeon should be the absolute master of all even the little details of technique and these details peculiar perhaps to the surgeon who has originated the technique cannot all be

THE BUTTERFLY RETRACTOR IN OPERATIONS ON THE GALL-DUCTS

By FRANCIS REDER, M.D. ST. LOUIS

A SURGEON should never become irritated at his assistant who is doing his utmost to please. There are times however when nothing seems to go right and a somewhat ruffled peace on the part of the operator may be overlooked and excused. The assistant usually feels for his boss under such trying conditions and ignores any transitory flurry.

The upper right quadrant of the abdomen may present contingencies that come as near upsetting the sweet disposition of an operator as may be found in any other part of the human body. A satisfactory exposure of the gall-ducts usually imbues one with a congratulatory feeling. To accomplish such an exposure a good assistant is the first requisite. The assistant knows his latitude. He can do so much and no more. Instruments such as retractors, elevators and spreaders are more often out of place than in place in gall duct surgery. Sometimes however the right instrument properly placed will give the looked for aid so that a satisfactory exposure can be accomplished without difficulty. The butterfly

retractor as shown in the illustration has on a number of occasions proved to be a valuable aid in gaining a satisfactory exposure in the right upper quadrant of the abdomen.

It is a very simple instrument with well rounded corners having no screws and no projections to interfere or be in the way. The instrument is both a retractor and an elevator. It is an ordinary abdominal elevator having in the main blade a notch to give additional room for the gall bladder. Two blades are attached laterally to the main blade and these blades are simply riveted sufficiently tight to hold in any position in which they are placed.

The introduction is like that of any other retractor or elevator. Figure 1 shows the blades folded so that the introduction through the abdominal wall may be easily accomplished. The surgeon having familiarized himself with the operative field, knows to what extent he desires the wings to be spread. The spreading is easily accomplished with the fingers while the instrument is held in place. Figure 2 shows retractor with wings spread.

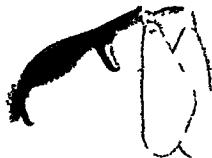


Fig. 1 Retractor with wings folded



Fig. 2 Retractor with wings spread

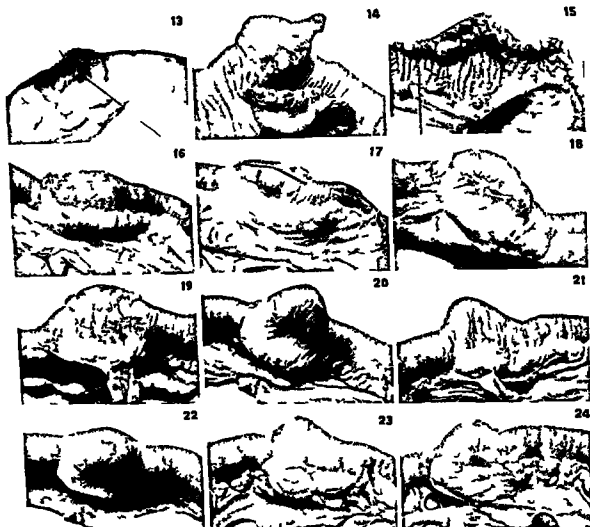


Fig 1 Seroserous suture finished the two threads merging from the opposite tip of the testine ready to be tied. Anastomosis completed.

Fig 4 Showing suture line inside the intestine.

Fig 5 Appearance of side of anastomosis six months after the operation.

Figs 6 and 7 Outside Appearance of same specimen.

Figs 8 and 9 Appearance of another specimen seven months after the operation.

Figs 10 and 11 Three views of another specimen eight months after operation. This and in specimen shown in Figs 3 and 4 the lines of the anastomosis.

Fig 12 Seen very plainly it can be seen how the two intestinal portions of intestine larger than each at tip leaving at the same time the natural lumen of both stumps of the same caliber as before the operation.

Figs 13 and 14 Two views of another specimen eight months after operation.

described in any paper nor can the technique be mastered simply by reading a description of the method. It is necessary that the method be tried on the cadaver or on living animals that the many little difficulties may be mastered. It is a mistake too often made that a new procedure is tried on patient and thus is not fair either to the

patient or to the originator of the method for especially if the result is not satisfactory the method is likely to be discarded simply because the surgeon had not mastered his technique and is therefore working under a great handicap in attempting to do the operation for the first time on a patient with a human life at stake.

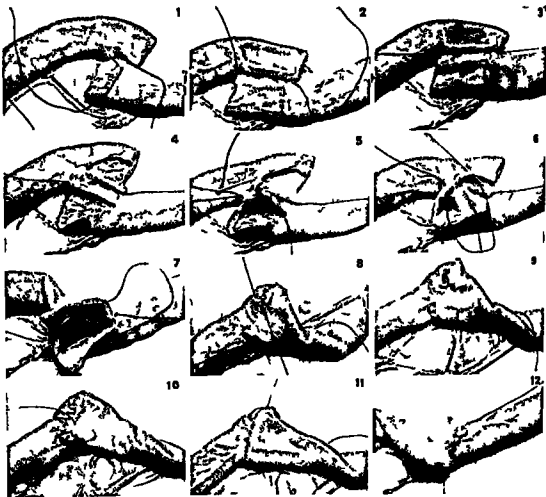


Fig 1 Approximation of the rectal stump and starting of the seroserosal suture

Fig 2 First part of the seroserosal suture finished each thread coming out about 3 mm opposite the cut edge of the other stump

Fig 3 How the thread should be pulled so as to closely approximate the serous surfaces without injuring them

Fig 4 The thread used for the seroserosal suture dropped and the rectal stump of the intestine rectified to distance of about 3 mm from the cut edge of the other stump and about 3 mm from the seroserosal suture

Fig 5 Beginning of the through and through suture with the needle at the left of the operator showing how to deal with the angle made by the incision

Fig 6 Continuation of the suture begun in Fig 5

Fig 7 The needle used in Figs 5 and 6 is dropped the other needle picked up and the through and through suture is continued in the same manner as in Figs 5 and 6, with the intestine on the right of the operator until the two sutures meet as shown Fig 8

Fig 8 Ending of the through and through suture each thread emerging on the serous surface of the opposite stump The thread must be gently pulled so to make the suture taut before tying the knot as shown in Fig 9

Fig 9 The through and through suture is finished, the knot tied and the surgeon is ready for the seroserosal suture fit having again closely approximated the serous surfaces by pulling the thread as shown in Fig 3

Fig 10 Beginning of the seroserosal suture the thread is left loose in order to show how the suture is made but in the actual operation it must always be kept taut as shown in Fig 11 so that no thread is seen between the approximated serosa of the stump of intestine

Fig 12 About half of the seroserosal suture finished the needle is dropped

Fig 13 After having made about half the suture as shown in Fig 12 the intestine is turned on the other side and the needle finishes the seroserosal suture in the same manner as done for the other half

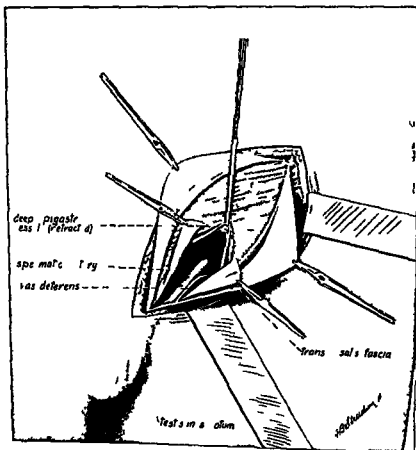


Fig 2

but that a testis can be placed in the scrotum with ease and it will remain in position but here we are grossly trespassing on anatomic and physiologic grounds. As shown by Moschcowitz (2) and others certain degenerative changes take place. I feel that this is not produced entirely by insufficient blood supply but by interference with the innervation to such a highly organized structure. Clinical observations and a study of the pathology lead me to believe that in such an organ even though the microscope reveals no areas of focal necrosis or areas of fibrosis the cells may undergo changes which cannot be readily seen. The internal secretion is diminished or changed and the spermatozoa although numerous and active lose their procreative properties. One cannot say that double undescended testes after operation have been restored to function because the patient is able to procreate. My personal attention has been called to an instance of a child who has

double undescended testes and whose father had double undescended testes which had never been operated upon. The question then arises whether it is better to have a functional active testis in the abdomen or one replaced which may or may not functionate.

Davison (3) overcomes to some extent some of these obstacles. He leaves the spermatic structures intact, cuts the deep epigastric vessels and advances the internal ring toward the median line. He places the spermatic structures which Bevan cuts around the bulge of the peritoneum thus using the hypotenuse of the triangle instead of the sides. But here again we interfere with the more or less essential anatomy of a part. Why cut the deep epigastric vessels when not necessary? This artery supplies a portion of the anterior abdominal wall and although collateral circulation is good yet certain changes must necessarily take place. We must as surgeons begin to look upon anatomic structures

THE TREATMENT OF UNDESCENDED TESTIS

SOME SUGGESTIONS AND MODIFICATIONS IN THE SURGICAL TECHNIQUE

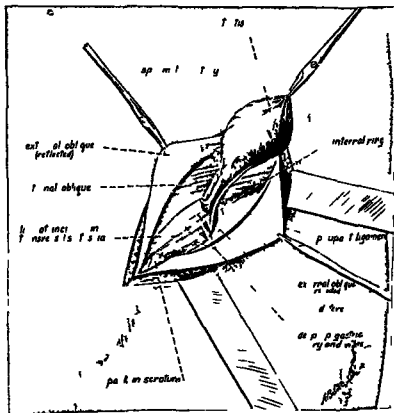
BY JOHN A. WOLFER, M.D., CHICAGO

Instructor in Surgery Northwestern University Medical School, Associate Surgeon Cook County Hospital
Assistant Surgeon Wesley Memorial Hospital

It is not the purpose of this communication to discuss in any way the theory for non partial or maldescent of the testis or to give reasons why a testicle should be placed in its normal position. Under certain conditions it may be deemed necessary by the surgeon to place a testis in its normal anatomic location. In some instances especially in patients about or just before the age of puberty it is possible to place the testis in the scrotum by simply freeing it from the perimastic tructures liberating the cord and placing it in a pocket in the scrotum the whole operation being practically that of

the Bassini operation for the cure of inguinal hernia. In other cases as in adults or when the cord is short it becomes impossible to bring the testicle down and if tension is used the testis usually becomes painful and begins to atrophy and sooner or later we find a small, tender and useless organ lying just outside of the external ring or it may even retract again into the inguinal canal. In such cases the testis gives the patient more distress than it did before the operation.

By using the technique of Bevan (2) that is, cutting the perimastic artery there is no question



Fig

transversalis fascia just median to the internal ring (Fig 1) By blunt dissection these vessels are easily freed and held out of the way with a blunt hook. The transversalis fascia is then cut down to the pubes. The testis is drawn behind the deep epigastric vessels. The vas will now follow down behind Poupart's ligament. The structures which extend upward and outward are freed from the peritoneum and dealt with as in the Davison operation—pushed behind the bulge of the peritoneum. Here care must be exercised as quite often the peritoneum is thin and easily torn. Again when a hernial sac is present and it has been excised the ligature may tear off by tension and the peritoneum is torn before one becomes aware of the fact. Congenital hernie quite often are found associated with undescended testes. In these the sac is separated from the spermatic structures and enough of it is reserved to make a tunica vaginalis for the testicle, the rest being ligated and excised. When by posterior displacement of the spermatic structures sufficient length has been given the

cord to allow the testis to be placed in the lower part of the scrotum the gauze pack is removed from the scrotal fossa and the testis placed in the pocket prepared for it (Fig 2).

In doing this operation three times I have not found it necessary to fasten the testis in the scrotum aside from placing a catgut suture from the perosteum and tissues over the pubic spine to the inner border of Poupart's ligament in other words the testis is simply retained in the scrotum by obstructing the scrotal outlet. Instead of using fascial flaps to enlarge the scrotum as suggested by Thompson (4) I simply insist on the patient massaging and stretching the tense wall several times daily after the wound has healed thus giving the testis ample room.

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3. DAVISON, C. re. Gynec. and Obst. 1911, vii, 293.
4. THOMPSON, Lancet, Lond. 1877.

SUBPEDIOTRICAL OSTEOTOMY OF THE OS CALCIS FOR PIS CALCANEUS

REPORT OF TWO CASES

By WILLIS C. CAMPBELL, M.D. MEMPHIS, TENNESSEE

PIS CALCANUS is a much less frequent occurrence as an end result of anterior poliomyelitis than calcaneovalgus while calcaneovarus is extremely rare. It is not my purpose to discuss the causative mechanism of cavus which is always associated or a part of calcaneus but it is well known that if the muscles forming the heel cord become paralyzed when other muscles of the foot remain active there is a loss of muscular balance and the intrinsic muscles of the sole and plantar flexors approximate the forefoot and the heel elevating the arch (cavus). The os calcis is drawn forward so that it may be perpendicular or in direct line with the bones of the leg and the forefoot a mere appendage. The normal posterior contour of the heel is completely obliterated the posterior surface of the leg and heel being on the same plane the weight being borne on the posterior extremity of the os calcis. A similar deformity though not paralytic is found in the Chinese female foot which has been found in infancy.

Treatment of calcaneus by forcible correction

with fasciotomy may improve but is far from satisfactory. Jones has devised a two-stage operation which gives better results but it is often difficult in this country to obtain permission for one operative procedure. Whitman's a traguslectomy is an excellent procedure when lateral displacement is associated as calcaneovalgus. I have devised a simple procedure for calcaneus which has given excellent results in two cases herein reported.

The technique is as follows: A skin incision is made from the tip of the external malleolus parallel with the long axis of the os calcis and the fascia is incised in the same line exposing the peroneal tendons. The peroneus longus is drawn out severed and each end clamped. The peroneum is next incised and retracted. With a chisel a wedge is removed beginning just behind the posterior facet for articulation with the a tragus, sloping obliquely downward and forward (as the os calcis is more or less perpendicular in this condition) to within a fraction of an inch from the inferior surface and then directly



Fig 3 54350 H B age 12 Right testicle was never seen or felt by the patient or his parents. At times there appeared a small mass in the inguinal region at the internal ring which would disappear when lying down. Hernia on the left side. Operation June 6 1914. Double congenital hernia. Right testicle within the internal ring. Pictures taken two and on half months after operation. Testis, although higher than the left is freely movable and well within the scrotum.



Fig 4 54356 P M D age 30. Neither testis had ever been in the scrotum. Right testis about midway between the internal and external rings of the inguinal canal and very tender. Left testis never felt in canal. No scrotum in whatever position.

with some degree of seriousness and not remove or destroy them—unless of course it becomes of vital importance to the patient—simply because in our present rather narrow field of vision we see no harm in doing so. No doubt both deep epigastric arteries may be cut but are we justified in doing so?

This later question aroused in me the interest in trying to find some way to preserve these essential structures and yet replace a testicle. The following suggested itself:

The inguinal canal is opened as in the Bassini operation for the cure of inguinal hernia. A pocket is then prepared in the scrotum by stretching the parts with the fingers and packing a large piece of gauze into this fossa leaving it in position until the testis is prepared. The testis is then found and here at times, some difficulty is encountered. If the organ lies within the internal ring it may be hard to reach. The ring may have to be enlarged but usually the testicle can be delivered by picking up and freeing the structures emitting from the internal ring—the remnant of the gubernaculum ligament—using gentle traction on them and pressure on the abdomen just above the inguinal region. The cord is then freed separating the vas from the rest of the structures. It will be readily seen that the vas leads downward and to the median side while the other structures lead upward and outward.

The deep epigastric vessels usually two veins and the artery are readily found lying in the



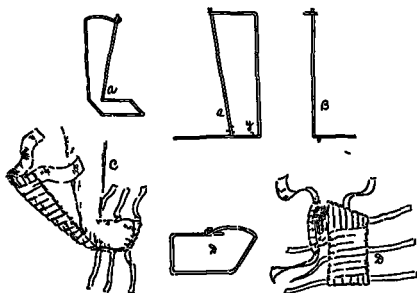
Fig 5 Same patient as Fig 4 nineteen days after operation. Upon operation the right testis was found in the inguinal canal left testis in the abdomen and firmly fixed. Patient has considerable edema about the site of the operation this causes the fullness about the upper part of the scrotum. Each testis is well within the scrotum, freely movable and not tender.

WIRE SPLINT IN THE EARLY TREATMENT OF CONGENITAL CLUB FOOT

BY A J DALTON M D St JOSEPH, ILLINOIS

I CLAIM no priority in the use of wire splints in the treatment of certain cases of congenital club-foot especially talipes varus and equinovarus but I wish to present a splint which has proved satisfactory in my hands. Non surgical treatment of this deformity usually implies the use of plaster casts and while I do not wish to

strips of ZO adhesive plaster one-half inch wide and six to eight inches long and one strip two inches wide and long enough to wrap around the splint at the calf are prepared. The limb is bathed in alcohol and dried after which the foot is firmly strapped to the foot piece of the splint then the upright part of the splint is



Splint made of No 8 galvanized wire. a lateral view b, posterior view c foot piece to be strapped first then leg piece to be pulled into position d,d looking from above down on padded splint

cast any reflection upon the use of this material yet I think the wire offers advantages which can not be had with the plaster.

The accompanying illustrations show how this splint is made. Number eight galvanized wire is used and bent to suit each case as to size. The angle α is about 90 for first application and this is gradually increased at subsequent treatments until the inversion is overcorrected to a satisfactory degree. The angle γ is also at about 90 for first application and is gradually lessened at each succeeding treatment until the equinus is overcorrected.

The splint is well padded and then wrapped with one-half to one inch bandage. Several

fastened to the leg at about two inches from the knee-joint. A smooth fitting bandage is applied and adhesive strips hold bandage in place.

If the deformity is not seen early it would probably be necessary to manipulate foot before applying the splint. The splint can be changed every two to three weeks but the limb must be bathed with alcohol each time to prevent any irritation from the adhesive.

The splint offers the following advantages. The skin can be inspected every few days if necessary. There is marked leverage to overcome the deformity of varus equinus either one or both. There is practically no tendency to necrosis. The splint is light and comfortable.

CARE AND FEEDING OF INCUBATOR BABIES¹

By CLIFFORD G. GRULEE, M.D. CHICAGO

ALL who have written upon the subject of infant mortality agree that the period when the death rate is highest is that of the first few weeks and especially the first week of life. The high death rate at this period is largely attributable to prematurity. This is perhaps best shown by the figures of Kerness. His statistics were taken from the University Gynecological Clinic at Munich. Of 10,297 births which occurred between the first of October 1907 and the first of October 1911 there were 149 abortions and 538 stillbirths. Of the remaining 9,610 children born alive 248 died of which only six lived longer than eight days. Of the 242 which died within the first eight days 181 or almost exactly three fourths were premature infants. Of these 181 cases the deaths in 140 cases were judged to be due to congenital debility a condition which offers no pathology except that of underdevelopment. It will be seen therefore how important it is for the purpose of the reduction of infant mortality to study carefully the conditions which present themselves in premature infants and in so far as possible to combat these conditions successfully. It is for that reason that I wish to present to you a report of the eight premature babies which have come under my care at the Presbyterian Hospital since December 31, 1913. I have omitted from this list no premature infants which were in that hospital under my care during this time. I must apologize for the fact that the number is so small but I hope that some of the points to be emphasized may be brought out by even so small a series of cases.

Baby Im 3 days old, entered the Presbyterian Hospital on December 31 with diagnosis of congenital debility. The child was one of twins, about seven months. The first child was a breech presentation and forceps had been used on the after coming head. This child was dead and apparently had been dead for some time according to the report of the father. The second twin the one concerned in this report was born in very few minutes after the first. According to the father she shot out with great force and yelled lustily right away. She was too small to nurse so he fed her with some sugar water giving little with a spoon every three hours. Evidently she was not fed freely from the first. On physical examination there was nothing specific to be noted.

The child, on the morning of the first day of January weighed 4 pounds 1 ounce temperature 96.2°F. It was put in the incubator the temperature remains constant

usually low until about February 1 when it began to be more regular and normal. This child was put on four hours of oral feeding starting with half-ounce of breast milk and gradually increasing until on the day of discharge March 4 it was getting 3 ounces six times a day. The weight increased during that time from 3 pounds 1 ounce to 4 pounds 3 ounces. The child left the hospital in excellent condition.

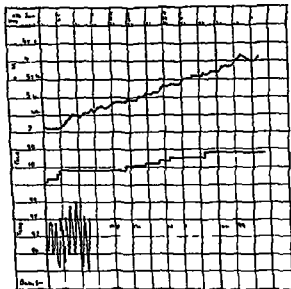
During this time in the early days, the child repeatedly regurgitated but never all of its feeding. The feeding was mostly by age. The regurgitation gradually decreased so that at the end of two weeks the child regurgitated perhaps once in two three days. The stools were normal and the course altogether uneventful. As the chart will show the only break of any consequence in the steady gain in weight was within the last four or five days before discharge.

According to the father's statement, the baby at 10 months of age was twenty six inches long, seventeen inches around the chest, and weighed sixteen pounds. She was able to stand and could walk little if assisted.

Baby F born February 3, 1914. The mother entered the hospital having severe pain in the abdomen which had been diagnosed as possible intussusception. On opening the abdomen the fetus was found free in the abdominal cavity. The mother died almost immediately after the operation. Estimation of the age of the fetus was not given. The child thus delivered weighed 3 pounds 9 ounces. It lost steadily from the date of birth and died on the fifth day having lost 9 ounces. On the fourth day after birth the temperature rose to 104°F to drop almost immediately to 96°F. The cause was not apparent. This child was given breast milk to the amount of 1/2 ounce every 1 or 2 hours. It vomited frequently without any apparent symptoms other than those previously mentioned. It died early on the morning of the fifth day.

Baby I born March 16, 1914. The child was delivered by cesarean section by Dr. Webster because of nephritis of pregnancy of the mother. The mother was primipara. This child was almost a term. The child was put to the breast every four hours after the first twenty four hours but refused to nurse on the fourth day so was given breast milk—an ounce and a fourth to two ounces very four hours until the fifteenth day. The food was then changed to 5 ounces of albumin milk and 3/4 ounces of dextrin maltose and 3 ounces of water six feedings of 3 ounces each every 4 hours. On April 5 this was increased to 6 ounces of albumin milk, 1 ounce of dextrin maltose, and 4 ounces of water. The child at birth weighed 6 pounds and dropped to 5 pounds 4 1/2 ounces. Up to March 29 the gain was very slow so that by that time it lacked 4 ounces of having regained its initial loss. From that time up to April 7 the child gained 6 to 6 pounds 8 1/2 ounces. Gain of 1/2 ounce in nine days. The child then left the hospital continuing on the same formula. On April 4 the child weighed 7 pounds on the 7th 7 pounds 7 ounces, the formula on the 11th about the same. The temperature in this case did not remain below normal for a length of time and

Albumin milk. On quart of human milk, be cards of quart of whole milk mixed with part of buttermilk made from fat-free milk and the whole made up to quart with sterile water.



is the incubator as short. From recent accounts this child is nine months is a perfectly strong healthy baby.

BABY M born May 914 by cesarean section carried out by Dr J C Wister. The child was a seven months baby weighed at birth 3 pound 0 ounces. It dropped so that on the sixth day its weight was 2 pounds 5 ounces. It was necessary from the start to feed this child artificially so that for the first month the child received only artificial food. We began with six feedings of ounces of albumin milk each on the third day. To this was added $\frac{1}{2}$ ounce of dextrin maltose; the six feedings on the sixth day. This was further increased until by the end of the first month the child was getting 9 ounces of albumin milk $\frac{1}{2}$ ounce dextrin maltose six feedings of $\frac{1}{2}$ ounces each. On June 1 when the artificial feeding was stopped the child weighed 3 pounds 7 ounces just 3 ounces less than its birth weight. From then on it was fed on breast milk start with six feedings 1 2 ounces each every 4 hours and down so that on July 10 the child was getting six feedings of 2 1/2 ounces each. During the time the child had gained from 3 pound 7 ounces on June 1 to 4 pound 1 ounce on July 10 gain in thirty days of only 21 ounces. The child was then shifted to artificial food the amount being gradually increased until on August 1 it was getting 3 ounces of albumin milk 1 of dextrin maltose and 5 of water, six feedings of 3 ounces each. On August 1 the child had a weight curve which was very peculiar. It rose from 4 pounds 2 ounces to 4 pounds 8 1/2 ounces on the 20th, gained 6 1/2 ounces a week from July 20 to August 4, lost gain down to 4 pounds 3 ounces. On August 4 the food was again reduced 3 ounces albumin milk 1/2 ounce dextrin maltose, and 6 of water. The child continued to lose till August 10 when it had gained reduced to 4 pounds 3 ounces. Then it had a gain-down course until on the 15th it was continued with much success until the first of September when the child was put on albumin milk. The child did very well but lost slightly when the albumin milk was changed to Libby's (preparation of evaporated albumin milk which is possible to use in the home). This child had no marked abnormal temperature.

BABY MORRIS

Date of Feeding	Albumin Milk	Dextrin maltose	Water	Breast Milk	Nipple feeding in twenty four hours	Temperature Day	Temperature Night	Amount of Each Feeding
7-1	6				6			
7-2	6				6			
7-3	6				6			
7-4	6				6			
7-5	6				6			
7-6	6				6			
7-7	6				6			
7-8	6				6			
7-9	6				6			
7-10	6				6			
7-11	6				6			
7-12	6				6			
7-13	6				6			
7-14	6				6			
7-15	6				6			
7-16	6				6			
7-17	6				6			
7-18	6				6			
7-19	6				6			
7-20	6				6			
7-21	6				6			
7-22	6				6			
7-23	6				6			
7-24	6				6			
7-25	6				6			
7-26	6				6			
7-27	6				6			
7-28	6				6			
7-29	6				6			
7-30	6				6			
7-31	6				6			
8-1	6				6			
8-2	6				6			
8-3	6				6			
8-4	6				6			
8-5	6				6			
8-6	6				6			
8-7	6				6			
8-8	6				6			
8-9	6				6			
8-10	6				6			
8-11	6				6			
8-12	6				6			
8-13	6				6			
8-14	6				6			
8-15	6				6			
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8-23	6				6			
8-24	6				6			
8-25	6				6			
8-26	6				6			
8-27	6				6			
8-28	6				6			
8-29	6				6			
8-30	6				6			
8-31	6				6			

On the 21st day the temperature was down as low as 96 F but soon rose again. The reaction in temperature was not any more marked than was usual with an incubator baby. This variation ceased by the end of the first month and by the middle of the first month the temperature was about normal.

Most interesting in this case however were the urinary findings. On May 14 the fourth day of life the urine was examined and found to contain not only nucleio-albumin but a very large amount of serum albumin and leucocytes. On the strength of these findings a bad prognosis for the child was given. This albuminuria continued a week later there were still traces of albumin and this continued regularly until June 5 until the child was about five weeks of age. As to the nature of this albuminuria it would be pretty hard to say though it seems altogether likely that in this case the kidneys were affected in very much the same manner as were the kidneys of the mother the toxemia affecting the mother probably having a like effect on the child. It seems to me for this reason that it is quite remarkable that this child lived.

BABY A was a premature case of Dr Roberts born at seven months; normal labor on August 18 94. At birth the child weighed 3 pounds 3 ounces the initial drop was 1 1/2 pounds 2 1/2 ounces the latter point being reached on the fourth day. From then on the child gained regularly so that on the day it left the hospital September 22 at five weeks of age the child weighed 3 pounds 4 1/2 ounces, net gain from birth 1 1/2 ounces. This child showed very few disturbances of temperature. It was fed at four hour intervals with breast milk beginning on August 18 with 63 ounces in six feedings of 1 1/4 ounces each. After it was found that the mother secreted no breast milk this was increased so that at the time it left the hospital the amount was six feedings of 1 1/4 ounces each. This child like most of these infants regurgitated a little the first few days. This became very slight so that by August 3 only one regurgitation is mentioned. The child made a successful recovery and left the hospital good condition.

On August 22 entered the Presbyterian Hospital on my service on September 1st. The child was seven days. No definite history of degree of prematurity to be noted. The child on entrance weighed 3 pounds 4 1/2 ounces the tem-

CARE AND FEEDING OF INCUBATOR BABIES¹

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ALL who have written upon the subject of infant mortality agree that the period when the death rate is highest is that of the first few weeks and especially the first week of life. The high death rate at this period is largely attributable to prematurity. This is perhaps best shown by the figures of Kerness. His statistics were taken from the University Gynecological Clinic at Munich. Of 2097 births which occurred between the first of October 1907 and the first of October 1911 there were 149 abortions and 538 stillbirths. Of the remaining 9610 children born alive 248 died of which only 17 lived longer than eight days. Of the 242 which died within the first eight days 181 or almost exactly three fourths were premature infants. Of these 181 cases the deaths in 140 cases were judged to be due to congenital debility, a condition which offers no pathology except that of underdevelopment. It will be seen therefore how important it is for the purpose of the reduction of infant mortality to study carefully the conditions which present themselves in premature infants and in so far as possible to combat these conditions successfully. It is for that reason that I wish to present to you a report of the eight premature babies which have come under my care at the Presbyterian Hospital since December 31, 1913. I have omitted from this list no premature infants which were in that hospital under my care during this time. I must apologize for the fact that the number is so small but I hope that some of the points to be emphasized may be brought out by even so small a series of cases.

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The child, on the morning of the first day of January, weighed 10 pounds, 10 ounces, temperature 96.2°F. It was put in the incubator the temperature remaining constant.

Read before the Chicago Gynecological Society

usually low until about February 1 when it began to be more regular and normal. This child was put on four hourly intervals feeding starting with half-ounce of breast milk and gradually increasing until on the day of discharge, March 4, it was getting 3 ounces six times a day the weight increasing during that time from 2 pounds 1 ounce to 4 pounds 1 ounce. The child left the hospital in excellent condition.

During this time in the early days, the child repeatedly regurgitated but never all of its feeding. The feeding was mostly by gavage. The regurgitation gradually decreased so that at the end of two weeks the child regurgitated perhaps once in two or three days. The stools were normal and the course altogether uneventful. As the chart will show the only break of any consequence in the steady gain in weight was within the last four or five days before discharge.

According to the father's statement, the baby at 10 months of age was twenty-six inches long, seventeen inches around the chest, and weighed sixteen pounds. She was able to stand and could walk like a normal child.

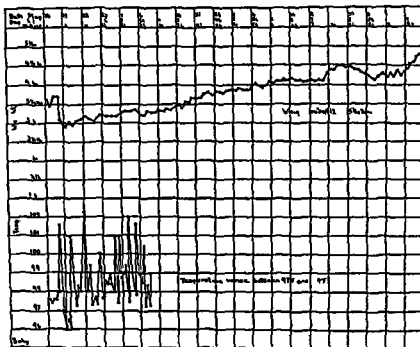
BABY F born February 3, 1914. The mother entered the hospital having a severe pain in the abdomen which had been diagnosed as possible intussusception. On opening the abdomen the fetus was found free in the abdominal cavity. The mother died almost immediately after the operation. Estimation of the age of the fetus as not given. The child thus delivered weighed 1 pound 9 ounces. It lost steadily from the date of birth and died on the fifth day having lost 9 ounces. On the fourth day after birth the temperature rose to 103.4°F. to drop almost immediately to 96.2°F. The cause was not apparent. This child was given breast milk to the amount of 1/2 ounce every four hours. It vomited frequently with a yellow apparent symptoms other than those previously mentioned. It died early on the morning of the fifth day.

BABY I born March 6, 1914. The child was delivered by cesarean section by Dr. Webster because of nephritis of pregnancy of the mother. The mother was primipara. This child was almost at term. The child was put to the breast every four hours after the first twenty-four hours but refused to nurse on the fourth day so was given breast milk—a ounce and four drops to two ounces, every four hours until the fifteenth day. The food was then changed to 5 ounces of albumin milk and 3 ounces of dextrin maltose and 3 ounces of water, six feedings of 3 ounces each every 4 hours. On April 5, the weight was increased to 6 ounces of albumin milk, 3 ounces of dextrin maltose and 3 ounces of water. The child at birth weighed 6 pounds and dropped to 5 pounds 14 ounces. Up to March 29 the gain was very slow so that by the 1st of April it lacked 1 ounce of weight required for the initial loss. From that time up to April 7 the child gained 10 to 6 pounds 8 1/2 ounces, gain of 1/2 ounce in nine days. The child then left the hospital continuing on the same formula. On April 4 the child weighed 7 pounds 10 ounces, 7th day 7 pounds 7 ounces, the formula continued about the same. The temperature in this case did not remain below normal for any length of time and

Albumin 1/2. One quart of formula milk (the child of weight of 10 lbs. milk mixed with part of best cream 100 and be made up to quart with sterile water.)

November 20

(See discussion p. 2)



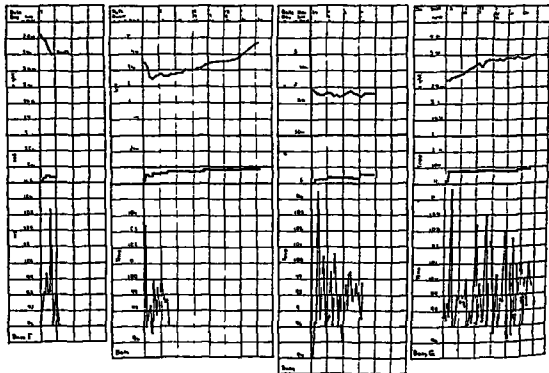
incubator from 95°F to 104°F. The weight dropped as low as 1 pound 12 ounces on the eighth day. It has since risen to pound 5 ounces on November 9 the twenty fifth day of life. What the ultimate result will be in this case yet remains in doubt though the present outlook seems good.

You will note that in these histories I have said very little about the care of the infant merely detailing the various clinical points of interest. It has seemed to me that in the treatment of diseases of infancy far too much stress has been laid upon the medical treatment and far too little upon the nursing facilities. In my experience the results obtained in infant feeding in general have to a large extent been successful or unsuccessful depending upon the character of the care which the child obtained. This is especially true of the premature infant. It should be emphasized that too much care is much worse for these children than too little but it also should be emphasized that intelligent scientific nursing with good judgment on the part of the nurse is absolutely necessary in the care of the premature infant.

The babies included in this small series were all in electrically heated incubators. These incubators as you all doubtless know are subject at times to changes of temperature which have a most decided effect upon the temperature of the infant. It has long been

regarded as a cardinal principle in the care of the premature infant that the temperature of the body must be conserved under any and all circumstances and that if the temperature of the incubator drops a few degrees the drop in the temperature of the infant's body may be such as to imperil life. I have not however seen much mention made of the danger of a sudden rise in temperature of the incubator and yet in this series of cases this fact was very noticeable the temperature rising sometimes as high as 103° or 104° due to a sudden rise in the temperature of the incubator. Certainly such a rise in temperature in premature infants is not to be totally disregarded and a careful observation of the temperature within the incubator at frequent intervals is also for this reason necessary if one wishes to get the best results.

We were peculiarly fortunate in this series of cases to have no case where the temperature was below 94°F. As Budin has so beautifully shown the mortality in premature infants depends to a very great degree upon the temperature of the infant before admittance. Of one hundred and three infants weighing 3 pounds or less whose temperature at the time of entrance was 90° or under only two lived of seventy two whose temperature was between 90 and 92.3 two lived of thirty



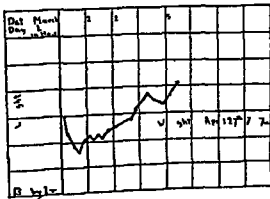
perature was slightly subnormal. On the third day the child cry suddenly shot up temperature to 103.6°F which fell almost immediately. It was altogether likely that the incubator at this time became very warm. The temperature of this child became quite irregular and we were not able to control it as we wished. The child left the hospital on October 20, at the age of thirty nine days. The weight at that time was 3 pounds 8 $\frac{1}{4}$ ounces a gain in four weeks of $\frac{1}{2}$ ounces. This child was fed at four hour intervals, being given on entrance $\frac{1}{4}$ later $\frac{1}{2}$ ounces of breast milk at each feeding. No regurgitation is mentioned in this case. The urine this instance two days after entering contained small amount of

nucleo-album and five to six leucocytes to the field on uncentrifuged specimen. This to degree might account for the uneven temperature but by us it was considered of no great significance.

BABY P was born at the Presbyterian Hospital on September 19, 1914, on the service of Dr. Webster. The child was premature, being estimated to be six and one-half months. The presentation was a breech. Most interesting in this case is the fact that in four previous pregnancies the mother had miscarried every time about the third month. So far as we could find there was no syphilis in it. This baby at birth weighed 3 pounds 8 ounces and decreased so that on the seventh day it reached its lowest weight of 2 pounds 3 ounces. It is still in the hospital having gained from September 29 to November 7 1 pound 5 $\frac{1}{4}$ ounces, its weight on November 7 being 3 pounds 8 ounces, net gain of 16 $\frac{1}{2}$ ounces in fifty seven days. The temperature in this case has been very irregular but is becoming more and more normal. The infant has been taken out of the incubator and is ready to go home. The child in the beginning was given six feedings of 1 ounce each of breast milk and this was increased to $\frac{1}{2}$ ounces regurgitated a little at first. This lasted only a short time and the condition at the time of writing was excellent.

BABY L was born on the service of Dr. Webster at the Presbyterian Hospital on October 26, 1914. Breech presentation but normal birth. Second child, both premature the other died. It was not possible to determine the exact fetal age. At birth it weighed 1 pound 1 ounce and the initial temperature was 94°F . This child has shown marked variation of temperature while in the

Patent left the hospital November



born infants were fed colostrum the nitrogen balance was well maintained. Arguing on this basis I felt justified in using a food which contained as large a percentage of protein as does albumin milk and I feel the two cases reported support such a theoretical basis.

In conclusion I wish to say first that this series is manifestly too small to permit of more than tentative statements in regard to the premature infant. The one fatal case was in an infant born under conditions which almost preclude the possibility of any extended period of existence. So far as I know no infant born under the same conditions has ever lived for more than a few days. It is very apparent that we have been fortunate in that the infants have not been tainted with any congenital disease such as syphilis which would render the task more difficult.

The three things which I would wish to emphasize in regard to these cases are

First the fact that attention to detail was largely responsible for the survival of seven out of eight premature babies.

Second that in every case the four hour interval was strictly observed.

Third that in the two cases which were fed artificially undiluted albumin milk was given to which within a few days was added carbohydrate in the form of a dextrin maltose mixture.

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AN UNUSUAL CASE OF GENITO-URINARY TUBERCULOSIS

By ROSS ANDERSON M D SALT LAKE CITY UTAH

MRS C J L age 34 housewife married. Family history negative. Past history negative.

History of present trouble In March 1913 the patient began to complain of backache and pain in right side. Two months later she gave birth to a healthy child. Since the birth of the child the patient has complained of slight fever, loss of appetite, weakness, night sweats, backache and pain in the right side. She had frequent desire to urinate and was very nervous. Menstruation began six months after child was born. It was regular but profuse and lasted seven days.

Physical examination General appearance run down. Mucous membranes pale. Tongue furred. Temperature 99½° F in morning and 103° F in the evening. Pulse 96 to 110 regular. Heart and lungs were in good condition. There was a tumor mass involving right tube and ovary.

Diagnosis Infection in right tube and ovary probably tubercular. I advised operation but the patient refused so I gave general tonic treatment.

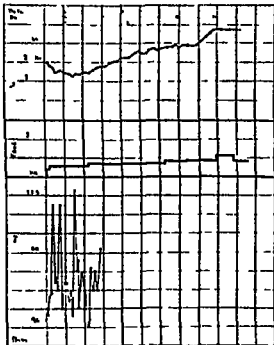
September 2 1914 or eighteen months after the beginning of the first symptoms I was called again. At this time the patient complained of severe pain in right side of body which was

worse in the shoulder and radiated down the right arm. She had headache. Examination showed that the tumor had grown larger, extended higher and seemed adherent to back.

Operation September 4 1914. Growth is seen to involve uterus, right tube and ovary, right ureter and kidney. Kidney shows hydro-nephrosis. I removed appendix which was adherent to mass, uterus, right tube and ovary, ureter and kidney. The growth involving the ureter was firmly adherent to the iliac artery and vein. In freeing the growth from the common iliac vein the vein tore as would wet pasteboard and this necessitated ligation in two places above and below the point of rupture. In closing the abdomen there was a marked venous oozing which showed how readily the collateral circulation was established.

The patient made an uneventful recovery and left the hospital on the twelfth day following the operation. The pathologist reports that the tumor was not a new growth but a degenerative process, but he was unable to give it a definite name. The growth showed a degenerative process identical with that seen in tubercular caseation.

So far as I have been able to search the literature I have never found a case reported where the common iliac vein was ligated.



nine weighing between 3 and 4½ pounds whose temperature was under 90° one lived while of eighty three whose temperature was between 90° and 92.3° twelve lived. Of those weighing over 4½ pounds with a temperature of 90° or under 12 died and two lived while of those with a temperature between 90° and 92.3° nine died and four lived. It will be seen from this that of the factors which influence life in premature babies not only temperature but also weight is of prime importance.

In regard to weight we were certainly not so fortunate in these cases as we were in regard to temperature. Of these eight babies one weighed less than 2 pounds three weighed between 2 and 3 pounds three weighed between 3 and 4 pounds and one weighed 6 pounds when first seen. At least two of the babies weighed less than a kilo.

The following routine was carried out in the care of the babies. Each infant was given an oil bath every day. This was carried out as quickly as possible in a very warm room and the child immediately returned to the incubator. In extremely small infants the covering consisted of a layer of cotton held in place with gauze those some heavier had a

slip and a small diaper. The only times when these babies were disturbed was at the time of feeding and when given water then if necessary they were changed and the food (and water) was administered. Water was given in small quantities midway between feedings. At first we tried feeding with a medicine dropper but this proved to be a very time-robbing process and one which seemed to induce vomiting. It was therefore very soon abandoned and in the earlier stages the children were all fed by gavage feeding being carried on in the incubator with of course doors open. The amount of food was determined by the size of the child varying from ½ to 1½ to 2 ounces. The point which I most wish to emphasize is the fact that no one of these babies was fed oftener than every four hours. Next to the careful attention which these infants received it has seemed to me that the four hour interval was largely responsible for our success. The infants all ceased regurgitating within a very few days after birth and apparently took good care of the food given. By means of the four hour interval we were able first to a large extent to prevent over feeding. Second to reduce the tendency to vomiting which in my experience has been a rather serious complication in these cases. Third to avoid frequent disturbances of the infant and hence to avoid subjecting it to frequent changes of temperature. Attacks of cyanosis which are accounted for by most writers on the score of both underfeeding and overfeeding were relatively rare in this series and I feel that this is strongly confirmatory of the results obtained by Litzenberg with the four hour interval.

You will probably remember that two of these cases were fed artificially that in these cases undiluted albumin milk was used and you may be surprised that one should recommend such concentrated nourishment for a premature baby. If we consult the various statistics which have been compiled upon the metabolism of the new born infant we find that with one exception all investigators have reported a negative nitrogen balance. The exception in this case however is so well taken and so ably defended that it seems to me that we must discard other conclusions and agree with Birk. Birk was the first to realize that the physiological food for a new born infant was not breast milk but colostrum a food which is rich in protein and poor in sugar and fat. He showed that when new

like that in puerperal toxæmia and bacteraemia is beyond the reach of incisive surgery because in both these diseases the organs are either too vital or too delicate to endure excision or even an adequately free exposure for drainage. Therefore treatment of meningitis should be developed chiefly along the line of control of the toxæmia and bacteraemia. This mode of management of an analogous condition has also been used by the obstetrician in his fight against puerperal streptococcal septicæmia that most destructive and dangerous obstetrical complication. In meningitis as in puerperal sepsis the most dangerous infections come through streptococci.

My attention was first called to the biological importance of magnesium sulphate through learning that it was capable of maturing unfertilized eggs of the sea urchin. It occurred to me that the stimulating effects of this magnesium salt might be turned to good account in surgical sepsis. For nearly ten years I have used this salt of magnesium in meningitis and the other toxic conditions of otolaryngology from the mildest to the most severe with great benefit.

The obstetrician in his most difficult problems of puerperal sepsis has used this salt intravenously with brilliant success. Since meningitis and puerperal sepsis are analogous in the respect that they are both impossible of surgical removal and are both due to the same bacterial infection it seems reasonable that the general treatment that benefits one will benefit the other.

My plan has been to give by mouth in repeated small doses as much of the well-diluted magnesium sulphate as the patient can tolerate without too great looseness of the bowel. The intravenous injection of magnesium sulphate the method used by the obstetrician in emergency is more efficient than the administration of the salt by mouth but under ordinary condition I have found the administration by mouth very convenient and effective.

TRIUMPH

Treatment of purulent septic meningitis consists of (1) treatment for relief of the intracranial pressure (2) treatment of the toxæmia and (3) treatment of the focal infection. The goal of the treatment is the control of intracranial pressure and toxæmia and the treatment should therefore be symptomatically directed against these two means of fatal terminations of the disease.

Cerebro-pinal meningitis owing to the topography of the meninges the vital importance of

the structures they cover and the fragility of these structures, offers no final surgical solution since excision and free drainage are impossible. The methods for the relief of intracranial pressure are few and simple and very effective. The various complicated methods that have been devised incur many fatalities and are no more effective than the simplest method. The type of surgical interference indicated depends upon the duration and gravity of the symptoms. In the grave and acute conditions the indication is, first, for decompression second, for drainage and third for removal of the primary focus. The best results seem to be from decompression by removal of enough of the calvarium to expose the dura mater by an area of an inch to an inch and a half as near as possible to the point of entry of the infection. If still more relief of pressure is needed, the area of exposed dura mater may be increased and the dura mater may be incised (Day's) reports recovery in a case of streptococcal meningitis after treatment by dual drainage. In mild subacute cases lumbar puncture may furnish sufficient decompression.

Local cranial drainage is provided by incision of the dura mater. This type of drainage is preferred to lumbar-puncture drainage because it drains directly from the focus of infection. In mild subacute cases in which the decompression operation may not appear to be urgent repeated lumbar puncture may provide sufficient drainage. Lumbar puncture is contra indicated in cases of definite intracranial pressure, lest it should assist in the drainage of the infection.

The seat of primary infection should be dealt with by appropriate surgical management. Local antiseptics such as tincture of iodine, alcohol, bichloride of mercury, aluminum and lead acetate 1 per cent, *formalin*, bacterium, boric acid, chinosol, phenol, *ess. de Jod* and many others are efficacious when indicated.

Toxemia The following are the methods of controlling toxemia and meningitis: (1) the administration of magnesium sulphate as an antiseptic alternative (2) the flushing of the blood-stream (3) immunization (4) administration of systemic and local antiseptics such as silver and mercuric salts and urotropine and (5) stimulating general hygiene. Of these methods, I have found that the administration of magnesium sulphate as an antiseptic alternative is by far the most efficacious. The animal is sedated and given the medicine in the form of capsules as the intestines slow down during the purging process.

following decompression all sign of meningitis had disappeared. Patient died 88 days after the decompression operation from toxæmia caused by the repeated secondary infection of the decompression wound.

CONCLUSION

The combination of our experience as otologists with the experience of the obstetrician makes the outlook for successful treatment of streptococcal cerebrospinal meningitis appear much brighter than it has previously appeared. Otolaryngologists should get as good results in cerebrospinal meningitis as the obstetrician obtains with puerperal sepsis cases. Although the surgeon can readily protect the patient from death by intracranial pressure the management of the sepsis is quite another problem. This problem of sepsis has received more attention from the obstetrician than from any other medical group

or specialty. The treatment should be focused on decompression local and systemic drainage administration of magnesium sulphate and stimulating general hygiene.

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HOW TO SHARPEN A SCALPEL

By V. BERRY, M.D., OAMULGER, O. LARSON

SOME time since an itinerant vendor entered my office from whom I purchase a paste called Onyute which when spread on a leather strop proved very effective in producing a keen edge on scalpels. I paid five dollars for three small boxes of the paste. In a short time I began to wonder what I should do when the supply ran out so had a small quantity of the paste washed out in ether and the powdery residue placed under the microscope. We found the residue similar if not identical with 122 No. 1 F carborundum powder which costs about forty cents per pound. One pound will make enough paste to equal about fifty dollars worth at the price I paid for the three boxes. The paste is made as follows:

A quantity of clean beef fat is rendered to common tallow strained through fine cloth or

canton flannel and while in the melted state carborundum powder No. 1 F is stirred into the melted tallow to make a stiff paste. The mixture is then allowed to cool.

To use the paste simply spread freely on a smooth strop lay the strop on a table and draw the scalpel back and forth at right angles not diagonally. This absolutely solves the problem of a keen-edged knife. In cold weather if the paste is too stiff add a drop or two of olive oil to the paste on the strop. If you wish an extremely smooth and keen edge to finish the sharpening a paste can be used of No. 2 F carborundum powder mixed in tallow. However the No. 1 gives an edge as sharp as a razor and a dull instrument can be sharpened in one-fourth the time that a stone will do it and the result is by far more satisfactory.

A research of the literature on the subject shows that in 1908 Meltzer (4) proved that a weak solution of magnesium sulphate could be injected into a vein without danger provided that it was injected slowly. Huggins (2) was the first to use magnesium sulphate intravenously for puerperal sepsis because he had found it useful as a local application in erysipelas. This was in 1910. He reported four cases of puerperal sepsis cured by the very low injection of 30 grains of magnesium sulphate in 8 ounces of normal saline solution. The same year Lobenstine (5) reported that out of five cases of puerperal sepsis four patients recovered. Three of these cases were cases of fulminating streptococcal toxemia the other was of streptococcal bacteremia. Treatment was intravenous injection of magnesium sulphate. Harrar (1) who says that magnesium sulphate is curative only in the acute stage of infection reports nine cases of severe puerperal infection five with bacteremia. Intravenous injection of magnesium sulphate resulted in recovery in eight cases. The maximum dose was 400 ccm of a 2 per cent solution of magnesium sulphate in freshly distilled water intravenously and 400 ccm by hypodermoclysis equal to 16 grains or 2.50 grains of the salt per day. The intravenous injection should according to this author take twenty minutes and should if required be repeated on the second or third day. In the Lying In Hospital of the City of New York the rate of mortality in puerperal streptococcal toxemia the form of puerperal infection most liable to be fatal has by this treatment been reduced from 93 per cent to 20 per cent.

The blood stream is flushed in either state with the hope of washing out some toxins. This is accomplished by intravenous injections of saline solution transfusion of blood epidermoclisis, proctoclysis and finally by the mouth all aided by venesection.

Immunizing treatment has been reported by some writers to be helpful in the treatment of purulent streptococcal cerebrospinal meningitis. My experience with this type of treatment has not yielded encouraging results. Day (3) reports a case of purulent streptococcal cerebrospinal meningitis cured by the use of anti-streptococcal serum and autogenous streptococcal vaccine.

The use of urotropin by the mouth hypodermally or intravenously in septic cerebrospinal meningitis, does not appear to the author to be an efficient method of treatment nor does the intrathecal injection of urotropin appear

to be much more efficacious because the subsequent action of the urotropin is very much in doubt. The liberation of formaldehyde may not be in sufficient quantity to sterilize the cerebrospinal meninges. It seems to me that a very definite action on the infection may be obtained by a direct antiseptic applied in the blood-stream or the cerebrospinal sac. Such an antiseptic as, for example a colloidal salt of silver or a mercurial salt.

To help the patient throw off the toxins and overcome the invading bacteria stimulating and general hygiene should be employed. Cures that follow prolonged acute infections may some times be attributed to wholesome food large quantities of water fresh air sunlight and complete rest quite as much as to any other method of treatment.

PROGNOSIS

In intracranial pressure nature is working against herself. The inflammatory reaction is needed to control the bacterial invasion. The reaction produces the intracranial increased pressure which when extreme causes death. It is a nice question of balance between death from the bacteria and death from intracranial pressure. The repeated microscopic and bacterial study of the cerebrospinal fluid is of great prognostic value since it shows favorable or unfavorable bacterial changes.

The course of the streptococcal cerebrospinal meningitis of the fulminating variety is death in a few days usually from intracerebral hypertension. In the less violent cases, death may supervene from toxemia at a highly later date. It does not appear either from my own experience or from research of the literature that streptococcal cerebrospinal meningitis has ever recovered spontaneously. The number of cases recorded where life has been prolonged beyond the acute stage of the meningitis have been so few that up to this time it may be called a disease with 100 per cent mortality. In the recent literature we have found only one case of cure a case of streptococcal cerebrospinal meningitis. This case is reported by Day (3).

I offer the following case showing recovery from purulent streptococcal cerebrospinal meningitis.

The patient was a man 3 years old. The symptoms were rapidly increasing coma, neuromuscular signs of meningitis, rigidity of neck, choked discs and purulent otitis media and mastoiditis. Temperature 101° pulse 4. Spinal fluid contained cocci in pairs and short chains and pus. Decompression at once removed the mental symptoms. Mastoid operation. Epidural drainage, enemata, saline solution by the mouth and solution of magnesium sulphate by the mouth. On the seventh day

DISCUSSION

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DR DORLAND How long had the foetus been dead?

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DR CHARLES E PADDOCK I cannot see any discrepancy in the size of the placenta and foetus One corresponds with the other It is possible the sac may have contained the foetus that the foetus may not have escaped at the time mentioned. I would like to know whether Dr Bacon is sure that it was liquor amnii that escaped

DR BACON The fluid was not examined but from the patient's description of the character and quantity of fluid I have no doubt it was liquor amnii The possibility of hydorrhoea amnialis has been disputed especially by the Germans, for many years Until recently cases of hydorrhoea were supposed to be of decidual origin but lately so many cases have been reported that everyone now acknowledges that there is such a thing as a hydorrhoea amnialis There are two varieties one where the foetus remains in the sac and the other where it escapes.

The possibility of making a diagnosis during the pregnancy depends upon the determination of the character of the contents of the fruit sac I do not know what the nature of the discharge was in this case although it was very watery The placenta corresponded to the size of the foetus but the sac itself was much smaller and was scarcely large enough to hold the head of the foetus There was no membrane lost the entire placenta was there it came away in one piece after extracting the child One can easily see I believe that the sac could not hold the child

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DISCUSSION

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DR WEBSTER No I have performed hysterectomies for fibroid tumors under local anesthesia and have always infiltrated the broad ligaments I have carried out a variety of operations under local anesthesia in the abdomen for conditions other than pregnancy but only twice in cases of excitable and not easily controlled Italian women was it necessary to abandon the procedure and to use a general anesthetic

One of my most interesting abdominal operations under local analgesia was in a case of abortion complicated with a strangulated inguinal hernia The patient was exsanguinated as a result of the abortion I removed the remains of the abortion packed the uterus made an inguinal incision resected about twelve inches of the intestine and repaired the hernia entirely under local anesthesia and the patient made a good recovery Murphy's button was used in closing the bowel

DR CHARLES E PADDOCK My experience with the use of local anesthesia in the cesarean operation is limited to one case This case was one where the patient was suffering from a mitral stenosis and in labor at term A one-half per cent novocaine solution was used with perfect success and apparently there was no discomfort until the child was removed From this time, owing to unnecessary traction on the broad ligament there was considerable pain. This pain I believe can be overcome if the idea be abandoned that manipulation and traction of the uterus are necessary to control hemorrhage It is not necessary to compress the broad ligaments or the uterus Bearing this in mind the entire operation can be conducted without pain to the patient. In the case mentioned novocaine was not injected into the uterus and the uterus was opened *in situ*

DR RUDOLPH W HOLMES Some years ago I had two cases of edema of the cervix both of which were in the last days of pregnancy One had at that time a tumor similar to the one described by Dr Webster The cervix was not ulcerated but still a mass half the size of a foetal head projected beyond the vulva. By keeping the patient recumbent with the hips elevated and by applying hot fomentations the edema rapidly disappeared so that at the time of labor the cervix offered no obstruction to labor and there was no anomalous dilatation. In this patient there was marked edema of the legs, due to pressure In the other patient the cervix was very large completely filling the vagina and while visible from the introitus did not extend beyond it

With reference to local anesthesia I have not used it in either cesarean section or other abdominal work I have seen a number of nerve-blocking cases in abdominal work and in each one there were at least disagreeable lamentations on the part of the patient the patients in two or three instances moaned and squirmed so vigorously that general anesthesia was required to complete the operations I have yet to be convinced that for the usual run of patients the risk

TRANSACTIONS OF SOCIETIES

CHICAGO GYNCOLOGICAL SOCIETY

REGULAR MEETING HELD NOVEMBER 30 1914 WITH THE PRESIDENT DR ROBERT T GILMONT,
IN THE CHAIR

DR CHARLES S BACON reported a case of
Extramembranous Development of the Fetus

Within the last twenty or thirty years the possibility of continued life and development of the fetus after its escape from the amniotic sac in consequence of a premature rupture of the membranes has been recognized and about fifty cases have been reported. This accident occurs generally between the twelfth and eighteenth weeks of gestation. The membranes contract to some extent around the cord and when labor occurs some weeks or months later the sac is obviously too small to hold the fetus. There is more or less continuous discharge of liquor amnii causing the hydrotheca uteri amnial. This fluid often contains considerable blood at first from the torn vessels of the ruptured membranes and later from the endometrium injured by the fetal movements.

There are probably different causes for the rupture of the membranes. Sometimes it may be due to trauma perhaps in an attempt at criminal abortion. Deciduitis has been blamed. In most of the cases reported there has been found a placenta marginata or circumvallata. Attempts have been made to make this abnormality the chief factor in the rupture of the membranes. That pregnancy should continue after the expulsion of the fetus from the sac is perhaps no more strange than are the cases in so very uncommon of missed abortion.

Patient Mrs G age 27 had on pregnancy 9 months normal labor at term May 9 1913. During the last month of pregnancy she had some toxic symptoms which were combated with rest bed diet and medication.

She menstruated about November 9 1913 and no used the December menstruation. In January 1914 he had a bloody discharge for a few days which he considered a menstrial flow. In February she had free flow for over two weeks which gradually stopped. At first it was bloody but later watery. During the month of March there was considerable watery discharge from the vagina, sometimes tinged with blood.

On the 30th of March while at toilet without recognition of the discharge there was sudden prolapse of the

cord from the vulva with little or no water. She went to the hospital where I saw her a few hours later. Coils of the cord were in the vagina and the cervix was dilated. I admit the passage of only the two portions of the cord. The fetus showed little tendency to expel its contents and the prolapsed cord furnished an open route for the contents. I saw the patient a few days later and about four hours after the first examination the cervix dilated somewhat and the fetus and after birth extracted. The traction of the fetus which prevented by the feet the pelvis was separated from the trunk and the head was torn off and had to be removed with large artery forceps. The fetal limbs were removed one piece with much mutilation.

The fetus was about 9 cm long and corresponded in development to the supposed duration of gestation about 9 weeks. It showed no marked deformity. The placenta was about 10 cm diameter. The opening of the fetal sac was at the border of the placenta on one side. The free border of the membranes as smooth and looked like the organized edge of a ring and not like fetal tissue. The diameter of the ring was about 3 1/2 cm, like the diameter of the sac was perhaps 5 cm. The sac was hardly large enough to hold the head of the fetus. The membranes showed a obscure fold at the attachment to the placenta which might suggest the beginning of a marginal fold in placenta marginata.

In this case there was a bloody discharge in the ninth week of pregnancy which did not end in a abortion and which might have been due to the low implantation of the egg. About the thirteenth week there was a rupture of the membranes and escape of the fetus from the amniotic sac. This was accompanied with a bloody watery discharge which continued for two weeks when it nearly stopped for a few days. From the sixteenth to the end of the nineteenth week when pregnancy terminated there was a continuous watery discharge sometimes tinged with blood.

The case corresponds with other cases of hydrotheca uteri amnial with extramembranous development of the fetus in all essential features. The amniotic sac was too small to contain the fetus. There was the hydrotheca which was at times bloody. At the time of labor there was apparently no rupture of membranes and escape of liquor amni.

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One of my most interesting abdominal operations under local anesthesia was in a case of abortion complicated with a strangulated inguinal hernia. The patient was exsanguinated as a result of the abortion. I removed the remains of the abortion packed the uterus made an inguinal incision resected about twelve inches of the intestine and repaired the hernia entirely under local anesthesia and the patient made a good recovery. Murphy's button was used in closing the bowel.

Dr. CHARLES E PADDOCK My experience with the use of local anesthesia in the cesarean operation is limited to one case. This case was one where the patient was suffering from a mitral stenosis and in labor at term. A one-half per cent novocaine solution was used with perfect success and apparently there was no discomfort until the child was removed. From this time owing to unnecessary traction on the broad ligament there was considerable pain. This pain I believe can be overcome if the idea be abandoned that manipulation and traction of the uterus are necessary to control hemorrhage. It is not necessary to compress the broad ligaments or the uterus. Bearing this in mind the entire operation can be conducted without pain to the patient. In the case mentioned novocaine was not injected into the uterus and the uterus was opened *in situ*.

Dr RUDOLPH W HOLMES Some years ago I had two cases of edema of the cervix both of which were in the last days of pregnancy. One had at that time a tumor similar to the one described by Dr Webster. The cervix was not ulcerated but still a mass half the size of a fetal head projected beyond the vulva. By keeping the patient recumbent with the hips elevated and by applying hot fomentations the edema rapidly disappeared so that at the time of labor the cervix offered no obstruction to labor and there was no anomalous dilatation. In this patient there was marked edema of the legs due to pressure. In the other patient the cervix was very large completely filling the vagina and while visible from the introitus did not extend beyond it.

With reference to local anesthesia I have not used it in either cesarean section or other abdominal work. I have seen a number of nerve-blocking cases in abdominal work and in each one there were at least disagreeable lamentations on the part of the patient. The patients in two or three instances moaned and squirmed so vigorously that general anesthesia was required to complete the operations. I have yet to be convinced that for the usual run of patients the risk

of a well administered general anæsthetic is any greater than mental shock incident to this local anæsthesia

DR. ROBERT T. GILLMORE: I have tried nerve-blocking in three or four cases and found that it was not very satisfactory. In two of the cases I had to resort to general anæsthesia after the abdomen was opened. However after the favorable experience of Dr. Webster I would not hesitate to try local anæsthesia again.

DR. N. SPROUT HENRY: My experience is limited to one case under local anæsthesia. I did not have quite as good success as Dr. Webster has had with his cases as I found it necessary to give the patient ether to close up the parietes.

I have been much impressed by the complete absence of apnoea in the cases delivered by Dr. Webster. It is a comforting experience to have the baby cry immediately with cesarean section because one should give strict attention to the mother and not have to spend time in attempts to revive foetus. The children without exception cry immediately in all the cases I have seen.

DR. WEBSTER (in closing): Dr. Paddock was correct in saying it was not necessary to grasp the broad ligaments, the cervix and lower uterine segment to control bleeding, but I do not think it is right to leave the tampon in that form. If one did not operate in labor but selected a time before labor had started, pituitrin should be given before the operation. After opening the abdomen one should wait a short time until hardening of the uterus occurred because if the latter is incised at this period there is likely to be a very slight loss of blood and retraction is likely to follow immediately after the contents of the uterus are removed. In this condition constriction of the ligaments and lower uterine segment is not necessary. If however there is no hardening of the uterus blood may escape freely from the divided vessels especially if the placental area be divided. If excessive it may be necessary for the assistant to exercise control by manual pressure as above mentioned.

I have done nearly one hundred abdominal cesarean sections and have never lost a mother. I have lost only one full term child the death occurring two or three days after delivery due to a defective cardiac condition. Curiously enough this was a case in which the operation had been done under local anæsthesia and no deleterious influence was traceable to chloroform or ether.

DR. WEBSTER also reported a case of Protrusion of the Cervix Beyond the Vagina in a Full Term Pregnant Woman. He stated that he had not seen a similar case in twenty five years.

The patient was a negro woman recently admitted to the Presbyterian Hospital in labor. There was protrusion of the cervix beyond the vulva about three inches in diameter. The cervix was markedly oedematous and congested, with an extensive erosion, being considerably strangulated by the pressure of the tissues around the nitrous vulva. The fetal head was above the brim and could be felt distinctly. The lower uterine segment was much stretched critically. The cervix dirty from rubbing against the patient's clothes was so dilated that one could introduce the thumb easily. It was cleaned externally and internally with iodine and pushed upward into the vagina which was also cleansed. Abdominal cesarean section was carried out by the mother and child recovering.

Such cases are very rare. It is rather remarkable that there should have been constriction of the cervix by the vulva in a woman who had given birth to three children. The nitrous vulva was small. The patient stated that she had had severe protracted labor for her first labor but there had been no trouble in her confinement. The protrusion of the cervix from the vulva in this instance had been noticed during the past three weeks having gradually increased in size. The urinary symptoms were practically no more than the ordinary woman experiences at full term pregnancy though there was marked pulling down and pressure of the bladder against the symphysis. The lower uterine segment was greatly stretched and attenuated and was therefore liable to rupture at labor as it would be to take place. Moreover the cervix was oedematous and easily torn. Abdominal cesarean section considered the safest method of delivery.

DR. RUDOLPH W. HOLMES exhibited a specimen of Bilateral Dermoid Cyst which had been removed from a woman 27 years of age and who had been married ten or eleven months.

Mr. Rich, her husband, about three months ago had a miscarriage. He stated the doctor had great difficulty in removing the products of conception. Shortly before her marriage her appendix was removed, and she was told that a palpation of her normal left adnexa was made. This woman stated that since full down stairs three years ago she has had pain in the right inguinal region in the intervals of menstruation, and that as soon as the flow is not blushed this markedly ameliorated. Since her miscarriage the gynaecological and backache have so increased that he had to have relief. A couple of weeks previously she had visited a physician who declared she had an adherent retroverted uterus and had advised operation for the rectification of this condition.

On examination I found masses filling the true pelvis which pushed the uterus strongly to the left. On the left and high up was a second tumor the size of an egg. On operation there was some considerable difficulty getting the large tumor up out of the pelvis, although there was no adhesion as on cut it fell strong atmospheric pressure. The tumor. The large tumor prevented the not uncommon appearance of a bilocular ovarian cyst. Tube and tumor were removed. As the left ovarian tumor presented a small area of apparent normal ovarian structure an attempt was made to resect this. The wall was so thick that the serous contents of the tumor squirted out and couple of drops fell out the abdominal incision. This account the left ovary was completely removed. On the third and fourth days the woman's temperature the fifth day the wound was red, and predicted a wound infection. The next day, because of very fetid pus escaped, colon bacillus infection being present.

Dermoid tumors are not rare but bilateral ones are more infrequent. That one of the tumors should have been a multilocular dermoid is unusual in my experience.

DR WEBSTER In one case of bilateral dermoid where one ovary was removed and the other resected I was able to conserve a small piece of ovary not larger than a bean and the woman has since borne two children.

DR EMIL RIES I understand Dr Holmes to say that there was infection of the abdominal wall with the escape of dermoid contents.

DR HOLMES I have not so stated but I believe that the fluid pus which escaped from the ventral incision was due to a colon bacillus infection which was caused by the dermoid contents touching the incision when the left cyst opened.

DR RIES Was the dermoid infected or suppurating?

DR HOLMES The left cyst was soft. From the sequence of events it would seem that it was already infected at least this is the way I interpreted the infection of the wound.

DR RIES From what we know of rupture of dermoid cysts spontaneously or accidentally without operation we could not assume that the contents of the cyst lead to suppurative traction of the tissues. One of the earliest cases of dermoid cyst on which I operated was in a young girl who had had such a rupture of a dermoid previous to the operation. There were particles of the dermoid grumous stuff and hair surrounded by omentum encapsulated by omentum without any further disturbance in the abdomen. In making an attempt to conserve a piece of ovary it happened occasionally that while cutting the dermoid away from the ovary one would cut into the lumen of the dermoid and there would be escape of a little dermoid tissue. I have done this in two cases and in neither one of them did suppuration follow. The material of a dermoid could not be considered other than bland. It is nothing but epithelial cells a little hair etc. and why that should lead to inflammatory reaction is not readily seen.

DR L. W. FISKE During the early part of this year I operated on a woman twenty two years of age for a chronic appendix through a McBurney incision. There were a great many adhesions present. After finishing the operation I explored the genital organs and found the ovary on the right side a little larger than the average English walnut. I judged the ovary to be cystic. The lower part seemed to be in good condition and I decided to resect a portion of the organ.

While resecting a little of the contents of the cysts escaped. I paid very little attention to this sewed up the ovary and after removing and examining the specimen found it was an ovarian cyst about the size of a small filbert. I am certain that this only droplet from the dermoid had come in contact with the visceral peritoneum, but the patient made an uneventful recovery without any suppuration.

DR JONES I have not had experience with soiling the abdominal cavity with the contents of dermoid cysts with infection following. Two years ago I looked up the literature of ovarian cysts complicating pregnancy and remember distinctly several writers spoke particularly of the danger of dermoids complicating pregnancy and of care in handling them with a view to excising the dermoid intact. If the dermoid is punctured precaution should be taken that the cyst be removed within twenty four hours after the delivery. Dermoids are dangerous in that they might lead to infection.

DR N. SPROTT HEANEY This recalls a case I saw when I was with Dr Webster. The patient was operated upon for extensive tuberculosis of the peritoneum. The uterus, tubes and ovaries were of normal size and appearance. A year and a half later she was operated upon for large bilateral dermoid cyst of the ovary.

Dr Holmes attributed the infection in his case to the presence of the caseous material from the dermoid. I believe this supposition is well founded. While perhaps not infective itself the contents act as a foreign body.

DR WILLIAM M. THOMPSON I would call your attention to a case of dermoid cyst complicating pregnancy which I reported to the Society eight years ago.

A large tumor presented behind the cervix. The woman had been in labor some twenty four hours and physician had applied forceps. The tumor presented itself more and more prominently, with dystocia. The cyst was almost as large as the full term uterus. It was the largest dermoid I have ever seen. The woman was delivered in a kitchen; the alums, and she recovered. A vaginal section making an incision behind the uterus was done. The dermoid was delivered, incised and the contents drained. The sac was drawn out and temporarily ligated, and the fetus which soon died delivered.

At the time I collected all the literature available on the subject of infections due to dermoid and while I had always understood that the material was infectious I was unable to verify this statement from the literature. While my case recovered the patient had an infection afterwards due undoubtedly to the manipulations practised for twelve hours before I saw her.

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Such cases are very rare. It is rather remarkable that there should have been constriction of the cervix by the vulva in a woman who had given birth to three children. The introitus was small. The patient stated that he had had uterine prolapse after her first labor but there had been no trouble in her confinements. The protrusion of the cervix from the vulva this instance had been noticed during the past three weeks, having gradually increased in size. The only symptom were practically no more than the ordinary woman experiences in full term pregnancy, though there was marked pulling down and pressure of the bladder against the symphysis. The lower uterine segment was greatly stretched and tension was therefore liable to rupture if labor was allowed to take place. To recover the cervix as ordered and easily torn abdominal cesarean section would be the safest method of delivery.

DR RUDOLPH W. HOLMES exhibited a specimen of Bilateral Dermoid Cyst which had been removed from a woman 27 years of age and who had been married ten or eleven months.

In March when married about three months, she had miscarriage. She stated that doctor had great difficulty in removing the products of conception. Shortly before her marriage her appendix was removed and she was told that palpation of her normal left adnexa was made. The woman stated that since fall down stairs three years ago she had had pain in the right adnexal region in the nature of menstruation, and that soon as the flow established this was markedly ameliorated. Since her miscarriage the gynecological and backache has so increased that he had to have relief. A couple of weeks previously she had consulted physician who declared she had adherent retroverted uterus and had advised an operation for the rectification of this condition.

On examination I found mass filling the true pelvis which pushed the uterus strongly to the left. On the left adnexa was a second tumor the size of an egg. On operation there was some considerable difficulty getting the large tumor out of the pelvis, although there are no adhesions on account of the strong atmospheric pressure on the tumor. The large tumor presented the not uncommon appearance of multicystic ovarian cyst. The adnexal tumor were removed. On the left ovary tumor presented small area of apparent normal ovarian structure. Attempt was made to excise this. The all was so thin that the serous fluid contents of the tumor squirted out and couple of drops of fluid from the abdominal incision on this account the left ovary was completely removed. On the third and fourth days the woman ran temperature, the fifth day the wound was red and predicted wound infection. The next day ounce of erythroid pus escaped, colon bacillus infection being present.

hour or every hour if there is any question as to the condition of the child

In regard to feeding these babies I object to the plan of four hour feeding as for practical purposes it is difficult to carry it out This might be done by Dr Grulee but for practical work it cannot be done Feeding should always be by mother's milk If the mother cannot furnish the milk it should be obtained from other mothers in the hospital or in some other hospital On the West Side a reasonable supply could be obtained from the Cook County Hospital The feeding of milk by the catheter is decidedly more difficult in the hands of the ordinary nurse than feeding by the dropper and I believe considerably more dangerous It is certainly possible to feed a child by the Breck feeder or by the dropper but it is not possible to give the child any such amounts It is rather questionable whether these amounts could be given with safety by the catheter There is more or less regurgitation which is dangerous It is necessary to feed the child a definite amount For practical purposes it is difficult to carry out the scientific feeding advocated by Dr Hess namely feeding by calones It is easier to carry out feeding as Budin advised who advocated giving definite amounts of mother's milk for the twenty four hours namely from one-sixth to one fifth of its weight in the case of small babies If a baby weighing three pounds should take at the end of a week or ten days one sixth of its weight it must have eight ounces of milk and if it could take only two drams at a time it should be fed more frequently It is necessary to feed children every hour for the first few days Later the number of feedings may be reduced to eighteen in twenty four hours and gradually as the amount is increased the interval and number of feedings may be decreased until one is able to adopt a three or possibly four hour schedule It is the quantity of food given the child which determines the frequency of feeding and no hard and fast rule can be laid down as to the frequency of the feedings The average nurse obtains the best results in this way

Dr N SPROAT HIFANEZ What are Dr Hess's reasons for not feeding a baby until it had its first bowel movement?

I would like also to utter a word of caution in regard to feeding mother's milk No mother's milk should be used for the nursing of a strange child no matter how fine her condition is or how healthy her own children appear to be unless she has a negative history physical examination and negative Wassermann test

Dr JULIUS H. HESS These babies should be fed before the mothers have milk in their breasts, which means food from another source With that milk bacteria enters the intestinal tract Meconium is composed in great part of protein matter and it is to avoid decomposition of the protein in the intestine that this point is made and also to ascertain positively that peristalsis occurs in the proper direction

Dr HOLMES Is it not better to wait until meconium had ceased coming?

Dr HESS With a mild laxative the period of starvation is greatly shortened which is of great importance in this class of infants

Dr GRULEE (in closing) I felt sure that the four hour feeding interval would receive a few knocks I wish to call attention to one point that has been overlooked in the feeding of infants There are two openings in the stomach one above and the other below and within a few seconds after food passes into the stomach it begins to pass out One would not overload a child's stomach by introducing a certain amount of food into it at one time I do not see why premature infants should differ from older ones in this respect Every man who has tried long intervals of infant feeding knows that regurgitation is markedly reduced It reduces very much the tendency to vomit because the stomach is not so frequently irritated

I am not altogether persuaded that a child should not be given food until it has had its first bowel movement

As to the question of human milk I wish to answer one point brought out by Dr Bacon I have been on the Cook County Hospital staff for three years and find it is very difficult to get breast milk there In the two cases reported where the children were fed artificially there was no chance to get breast milk and they were fed artificial food because I could not get anything else

As to temperature it ought to vary in the incubator with the condition of the child An effort is made to reduce the temperature in the incubator gradually two or three degrees at a time In spite of everything the temperature of the incubators does go up at times The temperature of the infant at birth is higher than the mouth temperature of the mother but it is reduced rapidly

One reason why these infants get along so well is that they are fed at four hour intervals The chief reason is that they received careful and intelligent attention

Dr HOLMES (in closing) It has been taught from my earliest medical training that dermoids, of all ovarian tumors are most likely to become contaminated by contiguity. Oftentimes the infection is latent and then under the influence of labor or some traumatism the infection actively lights up. From the very nature of dermoids the desquamated epithelial cells the sebaceous matter would make an excellent culture medium. Having that fixed idea I naturally presumed from the fact that dermoid matter had lodged on the wound that the infection was due to this source. I did not believe the infection was an extension of a process originating in the pelvis.

Dr. C. G. GRULEE read (by invitation) a paper entitled *Care and Feeding of Incubator Babies* (See p 234)

DISCUSSION

Dr. JULIUS H. HESS I regret that Dr Grulee gave so much credit for his success in treating premature infants to the four hour period of feeding and so little to his adequate care in the nursery because as yet there were only a few statistics published on the four hour feeding period of this class of infants. Those of Litzenburger and Dr Grulee's were the only ones of which I have personal knowledge in this country some having been published from European clinics. A great deal of success has been attained before this time by shorter interval feedings and whether the four hour period has a distinct advantage over the shorter interval between feedings, I am not prepared to say. Personally I still continue to feed premature infants at two- and three-hour intervals. My first group of cases consisted of seventeen cases which are the basis of a few figures which I present. In comparing Litzenburger's figures with my own I find that my seventeen babies gained more rapidly than the series of Litzenburger which consisted of fifteen cases. Each baby must be considered as an individual entity. However certain general rules as to feeding must be followed.

First, the infants were not fed milk until they had their first bowel movement. If necessary they were given five or eight minims of castor oil. After the first bowel movement feeding consisting of thirty calories of milk to each per kilogram of body weight is started. That would be one and a half ounces of milk to the kilogram of body weight. All of the premature infants were fed on human milk. There was no doubt many of these babies could be raised on artificial food but beyond any doubt the mortality must be higher. Following the first few days the

feeding was increased by ten calories per kilogram of body weight daily until ninety calories per kilogram of body weight was reached. After ten or fifteen days it was the aim to work up to somewhere between one hundred ten and one hundred thirty calories per kilogram for those over fifteen hundred grams in weight, and one hundred twenty to one hundred forty calories per kilogram body weight for those under fifteen hundred grams in weight. Huebner's figures for a full term baby are in the neighborhood of one hundred calories.

In feeding babies one should never lose sight of the individual case as no two can be fed the same. As to intestinal disturbances these babies cannot stand starvation and it is wrong to take food from them entirely. The amount of food can be reduced but all food must not be taken from them on account of intestinal disturbances. Many of these babies have been fed by catheter because of their inability to nurse. It is a mistake to put a baby of this kind to the wet nurse's breast until syphilis has been excluded as this disease is not uncommon among these infants.

(Dr Hess here exhibited an electrically heated water jacketed tub for the care of these babies to be used in place of the incubator). I am indebted to Dr. Lester F. Frankenthal for suggesting the use of a water jacket tub. By the application of an easily regulated electric heating apparatus with a simple rheostat a constant temperature is maintained the variable factor in its use being the room temperature.

Dr. CHARLES S. BACON There is one point about the temperature suggested by one of the cases reported by Dr Grulee to which I would call attention. The initial temperature of a baby delivered by caesarean section was found to be 95°. Without special care the temperature falls rapidly in a small baby but there is no reason why a baby should not be cared for from the beginning so that such a fall in temperature cannot occur. The temperature should be kept at 99°. The importance of temperature has been brought out very clearly by Dr Hess. Careful attention to details ought to include attention to the temperature of the incubator which should never be allowed to become so high that it will carry up the temperature of the child after the first three or four days. Sometimes in very feeble premature children in the first two or three days of life the temperature fluctuates remarkably. Whether this is due to the instability of the heat-regulating center of the child or to something else I do not know. The temperature in these cases ought to be taken every half

other American surgeons. It has always been necessary to seek authentic information in Schleich's *Schmerzlose Operationen* in Braun's *Local Anæsthesia* or in one of the other two or three foreign standard works. Fortunately the best of these foreign books have been translated but more fortunately still Allen's work appears now presented in such form as to fill practically every desire that the most fastidious searcher for information in this line might express.

The book is bulky, practically an encyclopædia of local anæsthesia done in six hundred well printed pages and divided into twenty three chapters as follows. The history of local anæsthesia; the distribution of sensory nerves and the physiology and philosophy of pain osmosis and diffusion; various local anæsthetics; toxicology; adrenalin; underlying technical principles; morphine; scopolamine; and combined drug anæsthesia; indications; contra indications; and shock; anæsthetic association; intra arterial anæsthesia; the special application of local anæsthesia to the various regions of the body (seven chapters); spinal analgesia; epidural injections; and paravertebral and parascapular anæsthesia. Every one of these various chapters is complete and stand as a stimulating example of the one vital principle which ought to underlie all good book writing, namely an urgent impulse to express thoughts, views and methods that have been carefully worked out thoroughly digested, distilled in the alembic of actual experience, found to be trustworthy and believed to be essential truths of real value to all workers in the same field.

It is a pity that Allen accepts root and branch the doctrine of anæsthetic association without at least a few words of critique. We would much rather have seen him qualify his statements after the fashion of Izquier in his recent article on Hypertrophy of the Brain. This could have been done without in any way detracting from the unimpaired practical value of the work and if it had been done would have strengthened our already strong faith in Allen's (all too) critical and selective judgment.

Allen describes as possible under local anæsthesia operations of the kind which many of us have performed with little difficulty in carrying out but in local anæsthesia in literature the style is like mine and it is undoubtedly true that one operator will accomplish much more satisfactory results than another equally competent confining seemingly strictly to the method.

THE McMillan Company of New York made it its first effort to prove that American medicine is making up to needs when this publication of Dr. Bainbridge. I do not know of another work in English that handles the cancer problem exactly as this book does. The excellent lum by W. Roger Williams approaches the same line very closely (and one wonders if

the way why Bainbridge does not include Williams book in the very full bibliography appended to the end of his volume) but makes a much less emphatic appeal to the general reader. For that matter even the classic German volumes by Borst, Wolff, Ribbert and von Hansemann although much more academic and authoritative do not fill exactly the same niche that Bainbridge carved out for his special task -- to produce a book of ready reference of convenient size giving in succinct and available form a summary of knowledge concerning the subject (cancer). The idea is to serve the general practitioner, specialist, intelligent layman and all those who are interested in questions of health maintenance.

This purpose is worked out in fourteen excellently conceived and consecutively developed chapters which furnish a clear and what is more important an interesting exposition of the ancient and modern history of cancer; its general distribution; statistical consideration; etiology; histopathology; a critical résumé of the results of cancer research; clinical considerations; prophylaxis; and so called cancer cures; non surgical treatment; surgical treatment; inoperable growths; institutional care of cancer patients; the campaign of education; and a final chapter on the outlook. And in all these chapters be it said to Dr. Bainbridge a credit there is no food for the morbid in the guise of melodramatic illustrations or hair raising word pictures.

With one exception each subject head is treated in satisfactory fashion. The exception occurs in Chapter I devoted to histopathology. Despite the overwhelming importance of the microscope in relation to cancer Bainbridge seems to have willfully slurred the subject and one feels that he did so in order not to dampen the interest of his intelligent layman reader. Then too there is a somewhat undesirable note of the impersonal in the book. Cancer surgery is *par excellence* a militant surgery and one seems to sense a false note in a book on cancer that is not also firm and true to scale in tone. It is of course a tremendously difficult task to collect, sift, rearrange and present all the facts that Bainbridge had to pass in review and he has accomplished his task so well on the whole that one feels loath to point out minor defects.

THE last two volumes of *Murphy's Clinics* are better than any that have appeared during the year. The material is richer and more varied and the editing incomparably better than it has been in the past. It is a particularly unqualified pleasure to be able to say this for as we have so often repeated much of the intrinsic value of the clinics has been marred by purely incidental errors and wholly avoidable flaws.

The August Clinic is particularly good. The introductory talk on leucæmia is of the type that one hears reading and that drives home the facts.

THE CURATOR OF THE MUSEUM OF THE HISTORY OF MEDICINE
 116 North 4th Street, Philadelphia, Pa.
 19106

BOOK REVIEWS

A CRITIQUE OF NEW BOOKS IN SURGERY

BY MAIL & C. SUTHERLAND ST. LOUIS

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On the first look one may say that this is a system of special urgency which through skillful editorial management has been given a high magnitude of interest and a balance of value rarely met with in any other journal. The very contributors must be in the

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for the unqualified talent that we graciously
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the significance of law as the best book of
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Clinical Congress of Surgeons of North America

SIXTH ANNUAL SESSION

BOSTON

OCTOBER 25 TO 30 1915

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THE CLINICAL CONGRESS IN BOSTON

THE sixth annual session of the Clinical Congress of Surgeons of North America will be held in Boston the week of October 25, 1915. An invitation was tendered by a committee of Boston surgeons and accepted by the executive committee on behalf of the Congress. A committee on arrangements composed of Boston surgeons representing the several hospitals has been formed (see list above) and is preparing a program of clinics and demonstrations that will afford the visiting surgeons a splendid opportunity of witnessing the work of the Boston surgeons and clinicians in their hospitals. The plans are comprehensive as the committee is determined that there shall be a complete showing of Boston's facilities in every branch of surgery and allied specialties. The clinical program will include operative clinics in general surgery, gynecology, obstetrics, genito-urinary surgery, orthopedics, surgery of the eye, ear, nose and throat, together with a large number of demonstrations in surgical and border line subjects.

The headquarters of the Congress will be at the Copley Plaza—Boston's newest hotel—which is centrally situated in the Back Bay dis-

trict and from which any of the hospitals and medical schools may readily be reached in a few minutes. The major portion of the ground floor of this hotel has been reserved for the use of the Congress during the week, affording ample space for the registration and ticket bureaus, bulletins, etc. Adjacent to these rooms is the large ball room in which will be held the evening meetings.

Following the precedent established at the London session, attendance at the Congress will be limited to a number that can be comfortably cared for at all times. An announcement of the plans for this session will be sent shortly to members of the Congress and advance registrations will be requested of all who wish to attend. When the required number of registrations is reached, no further applications will be received for the Boston session.

Admission to the clinics and demonstrations will be strictly controlled by means of special tickets which will be distributed daily at headquarters in order of application after the clinical schedule has been posted. The exact capacity of each theater and lecture room will be carefully ascertained in advance and the number of tickets

for each clinic an *demonstration* will be regulated in accordance therewith.

The importance of Boston as a medical center is so well established that little may be added to what is already well known with regard to its medical schools and hospitals. Boston has a large number of public and private hospitals and included in this list are several institutions which exemplify the most modern ideas as to construction and equipment. Notable examples are the Peter Bent Brigham Children's Hospital and Collis P. Huntington Memorial Hospital in connection with Harvard Medical School.

Among the hospitals which will cooperate in the clinical program are

Massachusetts General
Boston City
Children's
Hospiopathic
Peter Bent Brigham
Carney

Free Hospital for Women
St. Elizabeth's
New England Hospital for Women and Children
Robert Brigham
Frost
Faulkner
Lhot
Long Island
Lying In
Boston Dispensary
Massachusetts Eye and Ear Infirmary
Foreyth Infirmary

Following plans established at previous congresses there will be sessions each evening at which eminent American and foreign experts will read papers dealing with surgical subjects of present-day interest and these will be discussed by local workers. A preliminary program of these evening meetings will be published in the early issue of this Journal.

SURGERY, GYNECOLOGY AND OBSTETRICS

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UTERINE PROLAPSE WITH ASSOCIATED PELVIC RELAXATION¹

By C H MAYO M D ROCHESTER MINNESOTA

UTERINE prolapse as it is usually termed is in reality a form of hernia. The great majority of uteri take the retroverted position with the onset of prolapse. The retroverted position seems to be the common one of the uterus in over one fourth of women apparently in the majority of them without symptoms due to the position. It is possible for the uterus to undergo some degree of prolapse when it is in the vertical position in such a case it moves forward nearer to the pubes and encroaches upon the bladder space. It is evident that a slight degree of descent may occur without necessarily being considered pathologic.

While there are many varieties of operations for the relief of the various types of uterine prolapse there are only a few principles involved although various surgeons have made many modifications in technique.

In the majority of cases of retroversion in patients between the ages of 20 and 40 in whom the symptoms are serious and growing worse some form of external or intra abdominal operation on the ligaments to restore the uterus to position is indicated.

For the cases of mild prolapse with retroversion or flexion without other intra-abdominal complications for which an exploration would be advisable a simple Alexander operation on the round ligaments or some modification of the original technique has proved very efficient.

With retroversion and descent difficult to replace because of probable associated pelvic lesions or other abdominal complaint the true condition of which had best be known an intra abdominal operation should be made on the round ligaments. If as occasionally occurs the cervix remains too far forward the uterosacral ligaments or lateral folds of peritoneum should also be shortened to bring the uterus effectively to anteversion.

The interposition type of operation is very efficient in the relief of partial uterine prolapse associated with extensive cystocele. We have secured the best results from this method in cases in which there is a firm uterus which does not come out of the vagina in the anteverted position at operation. This usually means an age limit within the forties. This operation relieves cystocele and descent or the first and second degree of prolapse. In the third or fourth degrees of prolapse it should not be chosen. When made before the climacteric it is advisable to divide and invaginate the tubes at the uterine horns to prevent any possibility of pregnancy occurring with such a misplacement of the uterus. The uterus being rotated from the extreme retroverted position to an anteversion—a rotation of 165 degrees—and the bladder separated from the anterior vaginal wall the fundus of the uterus takes its place the bladder resting on the fundus and posterior part of the anteverted uterus. Patient with relieved

¹Read before the Southern Surgical and Gynecological Association, Asheville, North Carolina, December 23

for each clinic and demonstration will be regulated in accordance therewith.

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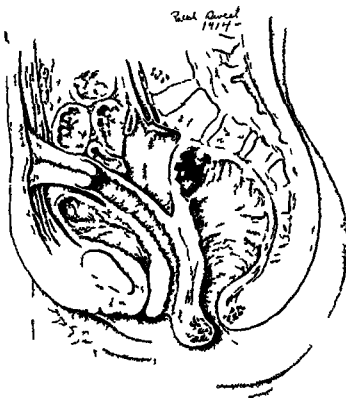


Fig. Cross section of suspension operation

mucosa with a complete closure of the vaginal outlet by an extensive restoration of the perineum leaving exposed only a small area of mucosa around the urethra. Occasionally a suprapubic operation is effective in re-attaching the stump of the cervix or upper vagina to the abdominal wall accompanied by an extensive perineal closure.

The Kocher operation or some modification of it is occasionally made upon women in the forties in which case the tubes are divided—but the method is usually reserved for women past the change of life with atrophied uteri. In deciding what cases may properly be treated by this method if when the cervix is gripped and pushed well up thus restoring the vaginal position the cystocele is

thereby greatly reduced the operation will probably be successful. If however the bladder has been torn loose from its uterine attachment and the restoration of the uterus to high position does not elevate it the Kocher principles of operation alone will not relieve the trouble. As a matter of fact it may be difficult to perform an operation which will securely fix the fundus of the uterus to and through the abdominal wall. The constant traction tends to cut out the sutures and while there is a string of adhesions the full support and elevation which apparently is satisfactory at the time of operation may not be permanent. As in the Murphy modification the uterus is drawn through the abdominal incision and bisected anteriorly and

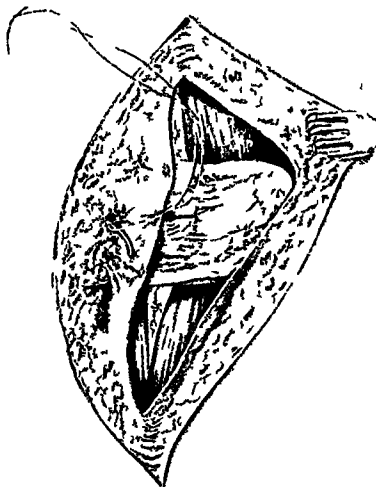


Fig. Suture of peritoneal uterus in situ

vaginal outlet and soft uterus may continue to feel some protrusion and often think the cystocele is still present. If this operation is applied to a woman in the fifties with a soft degenerating uterus undergoing rapid atrophy and in whom the torsion of the ligaments in anteversion still permits the uterus to be brought out of the body at the operation it will undoubtedly fail of relief and another method should be substituted. With the interposition operation in such cases we have seen within a few months the whole uterus

come out of the vagina broad-side followed by the bladder the condition of the patient then being worse than before operation.

In another class of patients usually from fifty to sixty five years of age where hysterectomy has been made without successfully supporting the cervical stumps or vaginal terminus prolapse of the vagina with cystocele and rectocele may develop six months to ten years following the operation. Some of these patients of advanced years are best relieved by total extirpation of the vaginal

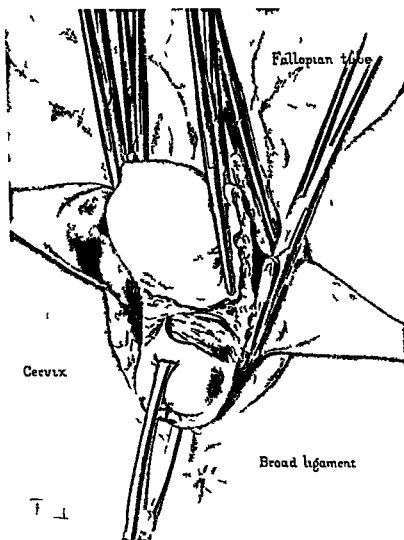


Fig 4 Incision of uterus and drawing of broad ligament

vaginal outlet the interposition type of operation is not indicated. For such cases with protrusion of the bladder from the uterus and a large cysticle in which the Kocher operation is also not indicated and the atrophy of uterus and ligaments too extensive for any intra-abdominal support to be secured we have long practiced the following very effectual method of securing relief.

The cervix is gripped with two pairs of Allis forceps and drawn well out of the vagina. A pair hypodermic incision is now made

with its apex one and one half inches below the external urinary meatus. It passes down each side of the cysticle and around the cervix (Fig 3). The sides of the incision are grasped and the vaginal wall readily separated from the bladder by blunt gauze dissection. The apex of the vaginal flap attached to the anterior lip of the cervix is turned down and the bladder rapidly separated by gauze dissection from the front of the uterus. As soon as the peritoneal fold is reached it is incised and divided laterally

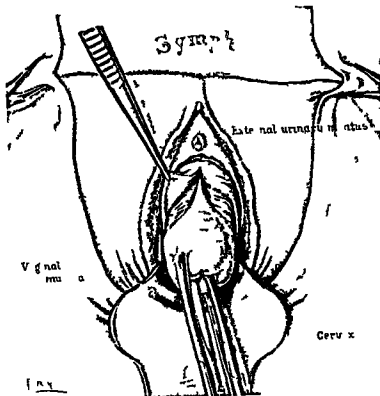


Fig. 3 Primary Y-shaped incision for vaginal hysterectomy

posteriorly down to the internal os. Each half is turned outward and all of the mucosa dissected out above the internal os leaving about a half thickness of the uterine wall. The peritoneum of the abdominal incision and the recti muscles are sutured all around the uterus at the level of the internal os. The aponeurosis is separated from the recti muscles opposite the projecting uterus. Each half of the fundus is turned outward over the recti muscle and beneath the aponeurosis to which they are secured by three mattress sutures on either side (Fig. 1). The aponeurosis itself and the recti muscles are now closed and the aponeurosis over the cervical uterine tissue is again caught by two deep sutures to it. The abdominal wall is closed without drainage. The sutures which include the uterine muscle tissue should not be drawn tight since the tissue easily cuts through. We have used silk and chromic catgut for sutures.

It differs from J. B. Murphy's method only in placing the uterine tissue over the recti muscles and under the aponeurosis leaving thereby a smoother abdominal wall and I believe makes a stronger support. After all it is not the prolapse of the uterus or the varicose ulcers and erosions upon its exposed surface but the cystocele and the malposition of the bladder which are the cause of the patient's discomfort. Such ulcers and erosions as may be found are seldom painful and the exposed and vaginal mucosa becomes so near like skin that it is probably less irritable than it frequently is when undergoing the senile atrophy of the mucosa of the vagina at the menopause without exposure to the air (Fig. 2).

For a large group of cases of the third and fourth degrees of prolapse in patients between 45 and 65 years of age often with atrophy of the uterus and distention of the

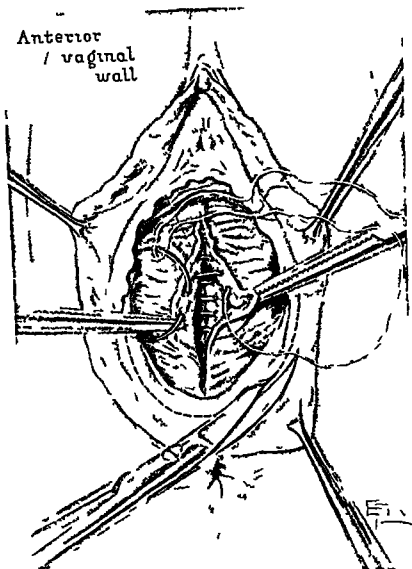


Fig 6 Incision of perineal body with closure of anterior vaginal wall

ids are now approximated laterally and a running mattress suture of chromic catgut is applied which passes back and forth behind the forcp completely through both ligament at such a distance as to tighten the broad ligaments (fig 5). An approximation of from one to one and one half inches of these ligament is secured. The method of suture is applied so as to interlock and prevent the inward slipping of any vessel. When the suturing reaches the round

ligament it is caught into the angle of dissection where the bladder has been separated from the anterior vaginal wall. This suturing extends backward on each side from this point catching into the broad ligaments and then on each side into the angle of the depth of the dissection thus compelling the bladder to rest on the broad ligaments. The loose end of the exposed broad ligament are now approximated by a running buttonhole stitch extending back to the perineal position.

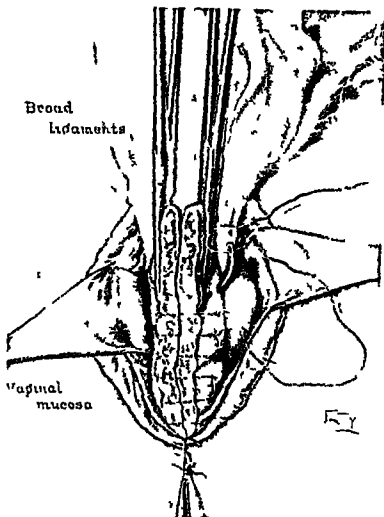


Fig. 5. Broad ligament spread out on gauze mattress.

The blunt gauze dissection now separates the posterior vaginal wall from the uterus at the side and on to the broad ligament. The sharp fork retractors are now used to draw the fundus of the uterus out of the incision as in an ordinary hysterectomy and the cervix is restored within the vagina. The broad ligaments are fully spread out on each side. Unless the ovaries are diseased they are not removed. A heavy hysterectomy forceps with long blades now grasps each broad ligament. The uterus is divided a half inch from the

forceps and two more pairs are applied one on each side with their tips catching the cul de sac behind the cervix. The uterus is then cut entirely away (Fig. 4). When the tissues are not sufficiently relaxed for easy approximation a little of the lateral wall of uterine tissue may be left attached to the broad ligament.

If there is any tendency of the sigmoid or omentum to prolapse it is held back by a long pad of gauze inserted into the peritoneal opening. The pairs of forceps two on each

II AN OLD AND INFECTED ABDOMINAL PREGNANCY WITH EXTENSION OF THE LONG BONES INTO THE BLADDER AND INTO THE BOWEL

Gyn No 13 806 L S aged 33 colored admitted to the Johns Hopkins Hospital May 3 1907 discharged June 26 1907 Apart from the fact that the woman had never been strong the early history was unimportant

The menses began at 13 and were regular She married at 18 Two years later she had a miscarriage at the third month and three years later a second at one month Ten years after marriage she had a child The labor was instrumental and there was much tearing She was in bed two months with high fever and had a great deal of vomiting and abdominal pain After this the periods became too frequent coming on practically every two weeks Since a supposed miscarriage (three years before admission) the menses have occurred at irregular intervals of four to eight weeks they have been profuse and have lasted from two to three weeks The last period began April 7 1907 and persisted for fourteen days

Present illness For the last five years the patient has had pain in the right lower abdomen usually dull in character and occasionally accompanied by nausea There have been no chills no fever and no vomiting The abdominal discomfort is not present every day It is aggravated by exertion

Three years ago the patient was supposed to be pregnant The period ceased there was morning sickness and later the perception of foetal move-

ments There was colostrum in the breasts and abdominal enlargement She developed severe abdominal pain which was labor like in character This lasted for five minutes and then suddenly ceased but the patient passed only blood Immediately after she noticed a hard tender lump in the right lower abdomen This lump has gradually become smaller as has also the abdominal enlargement The patient has not lost in strength There is no swelling of the feet but dyspnea has been noted on exertion, and for two months last winter there was a cough and occasionally night sweats The patient has had a good deal of indigestion but no jaundice She complains of burning in the urethra micturition is frequent and scanty and the urine at times is mixed with blood She has a profuse odorless but irritating vaginal discharge

On admission to the hospital the patient did not look acutely ill Her tongue however was furred The pulse was a little rapid but of good volume The abdomen was distended on the right side by an irregular nodular mass which on palpation gave a peculiar feeling of crepitus differing from anything that I have ever felt The mass was irregular but hard like a myoma On pelvic examination the cervix was found to be firm the uterus slightly enlarged and in retroposition On the right side was a mass which was apparently connected with the body of the uterus The structures on the left side could not be palpated

From the history and examination the condition was diagnosed before operation as an abdominal pregnancy The patient was catheterized when under ether and a large quantity of thick tenacious urine was obtained In the bladder the catheter also encountered something which felt very much like a stone

Operation May 4 1907 I made a median abdominal incision The peritoneum was opened and at once disclosed a large irregular mass in the right lower abdomen with the omentum densely adherent to it After the omentum had been doubly ligated and severed the upper portion was pushed back out of the way and the parts were carefully walled off The large and small bowels were found to be densely adherent to the sac The small bowel was dissected away as carefully as possible but the outer coat was torn about 12 inches above the ileocecal valve This tear was immediately repaired with a continuous Pagenstecher suture

On opening the sac I found it contained a large number of foetal bones as indicated in Fig 2 After removing the greater number of the bones I attempted to enucleate the sac The left tube and ovary were now removed and the sac on the right side was gradually loosened up The bladder was found densely adherent and connected with the extra uterine mass After being freed by blunt



Fig 1
ly high

Common
duct

Fig 2
A calcified lymph gland embedded in the bladder
d) the cyst and common bile duct
(c se)

and the sides of the vaginal mucosal flaps and closed by a running catgut suture in a sub-mucous manner (Fig 6) No sutures are exposed

By such an operation one secures all the advantages of the interposition operation without the disadvantages of atrophying uterus and muscles which will not support traction The complete elevation of the bladder is secured and it rests on the broad ligaments which make a complete transverse pelvic support Cystocele cannot form be-

tween the pubic bones and broad ligaments because their position is secured by suture Formerly the broad ligaments were passed by each other overlapping like a double breasted coat and two rows of sutures were required The present method is somewhat more simple as effectual and safer as no ends of vessel are left within the pelvic peritoneum Perineal restoration is of course included in all operations for prolapse These patients are usually confined to bed 10 days and remain slightly longer at the hospital

UNUSUAL CASES ILLUSTRATING POINTS IN DIAGNOSIS AND TREATMENT¹

- I A CALCIFIED LYMPH GLAND PRODUCING MPT IN SOMEWHAT SUGGESTIVE OF ALL STONES
- II AN OLD AND INFECTED ABDOMINAL FISTULA WITH EJECTION OF THE LONG BONES INTO THE LARD A INTO THE BOWEL
- III A FURTHER CASE OF A B. OMYOMA OF THE RECTO-VAGINAL SEPTUM
- IV OPERATION FOR THE RADICAL CURE OF A UMBILICAL HERNIA PATIENT WEIGHT 464 POUNDS
- V REMOVAL OF A LARGE TUBERCULOUS CYST OF THE UPPER PART OF THE JEJUNUM TOGETHER WITH THE CORRESPONDING REMOVAL OF OWEL RECOVER LATER DEATH APPARENTLY FROM TUBERCULOUS MYCOTIC

By THOMAS S. CULLEN, M.D., BALTIMORE

I A CALCIFIED LYMPH GLAND PRODUCING SYMPTOMS SOMEWHAT SUGGESTIVE OF GALL STONES

MRS C. S. was referred by Dr. S. Denny Wilson and operated upon at the Church Home and Infirmary on June 9, 1914. In December 1913 she had had sharp pain in the right lower abdominal quadrant and had been confined to bed for three days. There had been no vomiting at this time. In February 1914 she had had a second attack and ten days before admission a third. During this last attack there had been vomiting and fever. Her previous history was unimportant save for the fact that there had been a slight tenderness in the right lower quadrant. In other words the patient gave a definite history of a mild appendicitis and on one occasion there had been a yellowish tinge to the eyes.

Operation. I made right rectus incision not being absolutely certain whether the gall bladder was involved or not. We removed the appendix which was twice the natural size and contained a concretum. I examined the gall bladder again and felt what appeared to be a stone. I accordingly lengthened the incision and then saw a stone beneath the junction of the cystic and common duct (Fig. 1). This was irregular in outline about 1.5 cm. in diameter and embedded in a little scar tissue. It was gradually peeled out.

Dr. Paul Wegfarth who was standing by my side suggested that we were possibly dealing with a calcified lymph gland. Both ducts were of normal caliber and free from induration. Neither the common nor the cystic duct was opened. A small drain was carried down to the point of removal of the stone. Examination of the so-called stone tended to show that it was really a calcified lymph gland.

Dr. Wegfarth examined the stone chemically. With hydrochloric acid and also with nitric acid the stone substance dissolved completely leaving off a ribonucleic acid. The test for bile was negative. A portion of the stone was ground up and then mixed with alcohol and ether. Examination of the residue was made for cholesterol with negative results.

There is no doubt that this apparent calculus represented an area of calcification. Its size, shape and situation tend to show that it was a calcified lymph gland. The chemical examination demonstrated conclusively that it bore no resemblance whatsoever to a gall stone.



Fig. Pelvic bones contained the bony sac of an old abdominal pregnancy. These have been rough placed together. One end of the long bone (the bottom of the picture) is much thickened. This is due to the fact that it had ulcerated through into the bladder where it had become encrusted with phosphatic deposits. This bone has been photographed on large scale than the others.

dissection it was noted that the ends of the long bones projected into the bladder and that the portion within the bladder was covered with a thick de-

posit of urinary salts (Fig. 2). The bladder opening was closed with catgut and with a continuous Pagenstecher suture. The enucleation of the sac was continued until it was delivered from the abdomen. The large bowel was then examined. There were two openings in the cecum, one at the junction of the ileocecal valve. The vermiform appendix was thickened and indurated. It was situated 2 cm. from this hole in the cecum. The appendix was removed and the hole in the bowel closed in with two continuous Pagenstecher sutures. The second opening in the cecum was 6 cm. from the ileocecal valve. This was drawn up into the wound and sutured in a similar manner with two continuous Pagenstecher sutures. The holes in the bowel had been made by the ends of the long bones which had ulcerated through and were projecting into the lumen.

A parovarian cyst was also removed from the right side. A cigarette drain was placed at the lower angle of the incision and carried down to the cecal region and also into Douglas cul-de-sac. Owing to the difficulty in getting adequate exposure at the beginning of the operation the right rectus muscle was cut through.

The patient was returned to the ward in a very weakened condition. She had a quiet night but was much nauseated and saline infusions were given. On May 6 the retention catheter which had been left in the bladder was removed. On May 7 a note was made that the nausea still continued. The patient gradually improved although the abdominal incision broke down over a considerable area. After several days a small amount of urine commenced to escape from the abdominal wound. On June 25 it was noted that the wound looked very well. The leakage of urine had ceased. On the day of her discharge, June 27, the following note was made. The abdominal incision has healed well. There is no tenderness but still a little thickening of the incision. The patient has gained in weight and has generally improved. A cystoscope was introduced into the bladder. A reddening was found. The mucous membrane was everywhere white, glistening and smooth and the bladder necks were not injected. The urine was perfectly clear.

Path. A 11534. Sections from the wall of the sac show that it consists partly of omentum, partly of granulation tissue which is very edematous. The right ovary is adenomatous and cystic and measures 6.5 x 5.5 x 3 cm.

In this case the uterus had evidently ruptured at the time of the patient's severe pain and the fetus had escaped into the right lower abdomen. A slow inflammatory process had gradually developed and eventually the end of the long bones had been forced through into the bowel and bladder.

III A FURTHER CASE OF ADENOMYOMA OF THE RECTOVAGINAL SEPTUM

At the last meeting of the Southern Surgical and Gynecological Association I reported two cases of this character. At that time I referred to two instances recorded by Cuthbert Lockyer and also mentioned two specimens sent me by Dr D S Jessup.

Dr Jessup has since reported his two cases in full in the Section on Pathology and Physiology of the American Medical Association 1914. Recently another patient with adenomyoma of the rectovaginal septum has come under my care.

Miss K. T. aged 30 was referred to me by Dr Alexis McCannan October 26 1914. I first saw this patient at the Johns Hopkins Hospital on November 10 1906. At that time I removed the left tube and ovary and resected a portion of the right ovary. The appendix was also removed. When I saw her again she complained that she was incapacitated for two days before and after her period and that her suffering was almost unbearable. She was well nourished weighed 170 pounds and for the previous two or three months she had been having about six bowel movements a day. The stool had been normal in color. Her discomfort had been so great that she had resorted to having some thing done.

Operation October 19 1914. On opening the abdomen we found adhesions everywhere in the

pelvis and the rectum was almost completely obstructed just posterior to the cervix. We found it necessary to do a complete hysterectomy. This was accomplished with much difficulty. The ureters on both sides were outlined and the uterus was removed. The cervix was so densely adherent to the rectum over an area about 2.5 cm in diameter that it was necessary to cut through this tissue which was almost as hard as gristle. The rectum was carefully examined and found to be almost completely obstructed. It was then brought up as far as possible. Its peritoneum was severed but its vessels were not disturbed. After the rectum had been freed for about eight inches the pelvis was packed with gauze and the anal margin all the way around was incised just as for an extensive Whitehead operation. About eight inches of rectum were then drawn through the anus and removed together with the growth. The rectum was then attached to the skin. The patient did not lose very much blood considering all that was done.

After she was returned to the ward her pulse steadily increased although there was no evidence of hemorrhage. About seven hours after operation signs of sudden cardiac dilatation developed and the patient soon died.

The growth situated between the cervix and the rectum was intimately blended with both. It was



Fig. 1. Adenomyoma of the rectovaginal septum. The mass is embedded in the rectum and is well-defined and scattered throughout the wall of the gland. It is composed of stroma and large islands of endometrial tissue. The mass is large and the high power view shows the characteristic features.

Fig. 2. Adenomyoma of the rectovaginal septum. This is one of the islands of endometrial tissue seen in Fig. 1. The glands are delicate and those of the endometrium and they are embedded in the stroma. The mass is composed of the endometrium. This shows some mitotic cell division. Surrounding the island is a wall of fibrous material.

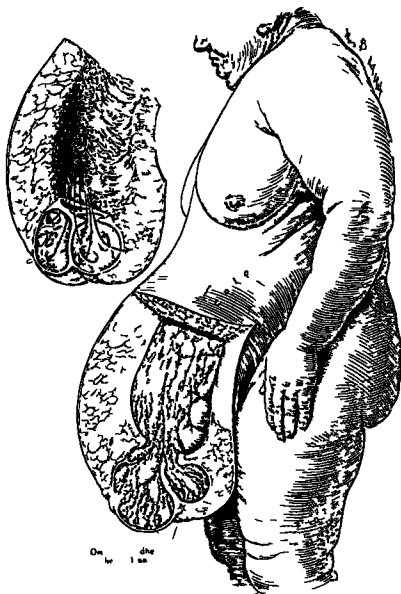


Fig 5 An umbilical hernia and marked pendulous abdomen in patient weighing 464 pounds. This is sketchy outline of the condition found. With the patient standing the dependent portion of the abdomen reached to knees. As the omentum was adherent to the hernial sac the transverse colon was pulled down. The dotted line indicates the line of dissection. The fat of the abdominal wall being removed down to the fascia. The hernial sac was dissected into numerous secondary cavities. This is particularly well seen in the upper sketch of the hernial sac, which was drawn after removal.

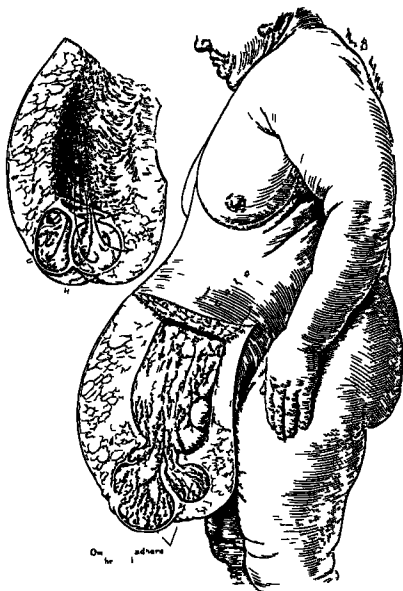


Fig 5 An umbilical hernia and markedly pendulous abdomen in patient weighing 464 pounds. The sketchy outline of the condition (1) and (2) with the patient standing (3) the dependent portion of the abdomen reached the knees. (4) the omentum was adherent to the hernial sac the transverse colon was markedly drawn downward. The dotted line indicates the line of dissection the fat of the abdomen (5) being removed down to the fascia. The hernial sac was divided into many secondary cavities. This is particularly well seen in the perspective sketch (6) of the hernial sac which was drawn after removal.

about 3 x 2 cm very dense in texture and projected into the lumen of the bowel. The rectal mucosa itself was intact normal and showed no evidence of ulceration or inflammation. In some places the muscle of the myoma was continuous with that of the bowel. At other points a little adipose tissue intervened or lobules of fat were surrounded by nonstriated muscle.

Scattered throughout this myomatous growth which was diffuse in character were islands of uterine mucosa (Figs 3 and 4). In some places just a triangle of the typical stroma of the mucosa was visible. At other points were isolated glands surrounded by stroma or a small cavity was seen lined with cylindrical epithelium which had glands extending into it. In other places there were large areas of uterine mucosa surrounded by the char-

acteristic stroma or there was a long drawn out ribbon like mass of stroma with one or two long and tortuous glands lying in it. In some sections there was a definite area of mucosa at least 8 mm long by 3 mm broad. Here with the low power the mucosa occupied more than one field no muscle being visible. Such areas are really miniature uterine cavities.

The growth is a typical adenomyoma of the recto vaginal septum evidently starting in or near the cervix and gradually invading the rectum by continuity but respecting the rectal mucosa at all points. The bowel was so nearly obstructed however that we were forced to remove at least 8 inches. The ideal method would have been to excise the area of the growth and then close up the defect.

IV. OPERATION FOR THE RADICAL CURE OF AN UMBILICAL HERNIA IN A PATIENT WEIGHING 464 POUNDS

Mrs C J aged 35 was admitted to the Church Home and Infirmary February 11 1914. She had had five children the youngest being eight months old. At the time of her marriage she weighed 225 pounds. Her weight on admission was 464 pounds. She complained of an umbilical hernia which was about 10 cm in diameter. When on her feet the abdomen hung down to the knees. The dragging sensation caused thereby was so great that she was forced to keep off her feet as much as possible.

Operation February 12 1914. I was unwilling to operate and explained the danger to her husband. The patient who is still a relatively young woman said she was becoming a semi invalid and insisted that she be relieved. On account of the marked redundancy of the abdominal wall we decided to remove a large quantity of fat with the hernia as advocated by Dr Howard A Kelly. Accordingly a large transverse elliptical area was outlined (Fig 6). This area when measured after removal was 36 inches from side to side and 19 inches from above downward. The adipose tissue of the tremendous flap was dissected from the fascia of the abdominal wall all around as far as the neck of the hernia. Then with the finger in the abdomen as a guide the neck of the sac was cut at its approach to the abdominal wall. The dotted line in Fig 5 indicates the line of dissection. The omentum in the sac was so intimately blended with the walls of the sac that this portion was cut off and removed together with the sac and redundant tissue.

In the upper sketch in Fig 5 Mr Brodel has clearly shown the neck of the sac and the numerous hernial protrusions from it. The hernial opening was closed by the McVay method of sliding the fascia of the lower margin of the opening up under that of the upper margin. We used kangaroo tendon for the mattress sutures and after the first row had been placed the inner edges of the upper flap were



Fig 6. A umbilical hernia associated with marked prolapse of the abdominal wall. The umbilical hernia was about 10 cm in diameter. The elliptical transverse incision indicated by the black line. The lower figure indicates the shape and size of the piece of adipose tissue removed.

fastened it with a second row of mattress sutures. The abdominal wound was now approximated by interrupted silver wire and silk intestinal sutures. Accurate line approximation was obtained by continuous black silk thread. At each end of the incision a protective drain was introduced.

The patient made a speedy recovery and the abdominal wound healed perfectly. When the stitches were removed the abdominal incision contracted until it measured only 27 inches from side to side. The patient eight months later was in excellent health.

REMOVAL OF A LARGE TUBERCULOUS CYST OF THE MESENTERY OF THE JEJUNUM TOGETHER WITH THE CORRESPONDING SEGMENT OF BOWEL RECOVERY AFTER DEATH SEVERELY FROM TUBERCULOUS MENINGITIS

Baby R, a first girl, 2½ years old, was referred to me by Dr. Julius Friedenwald and Dr. Harry Goldberg on May 2, 1914.

Two weeks before her admission to the Church Home and Infirmary a tumor was first noted in the upper abdomen. This was globular, apple-like to

be about 10 cm in diameter and could be pushed from one side of the abdomen to the other. It lay somewhat to the left of the median line.

There was a leukocytosis of 15,000. The urine was normal. The history gave absolutely no clue as to the probable character of the growth. The majority of those who saw the patient thought that the tumor was probably an enlarged left kidney but none ventured a positive diagnosis.

Operation. I made a median abdominal incision commencing a short distance below the umbilicus and ending near the umbilicus. The tumor lay below the transverse colon and was covered over by a greatly red, thickened and adherent omentum (Fig. 7). The omentum was cut across near the transverse colon and was gradually loosened up to the cystic tumor freeing it from several loops of small bowel and separating it from the adherent mesentery. After getting good exposure we found that the tumor sprang from the mesentery of the jejunum. We continued our dissection hoping that it would be possible to completely enucleate the cyst without injuring the blood supply of the jejunum. When this had been almost accomplished the tumor having been freed except over an area of about 3-3 cm, a little pus commenced to escape. Fortunately the tumor was at this stage of the operation mobile enough to be partially lifted out of the abdomen. It was slit open and evacuated into a large basin with little or no contamination of the abdominal contents. The sac contained also a good deal of a rather thin greenish yellow odorless pus. When empty it was clamped and removed. It was then found that the blood supply of a large area of the jejunum had been cut off by the same vessels that supplied the tumor. The blood supply of the bowel must of necessity have been cut off. The portion of the jejunum which had lost its blood supply was clamped and cut (Fig. 7). Both ends were closed and a lateral anastomosis was made. It had been necessary to cut off the jejunum about three inches from the point where it passed to the left over the vertebral column. This short and naturally made the anastomosis rather difficult. A cigarette drain was inserted near the anastomosis and the abdominal incision closed.

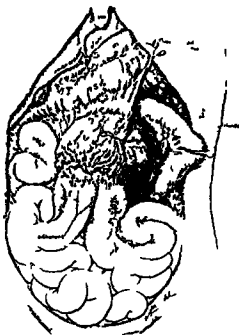


Fig. 7. At birth the cyst sprang from the mesentery of the jejunum. The cyst occupied the center of the upper abdomen and was partly covered by adherent red, greatly thickened omentum. Below it was adherent to several loops of small bowel. The omentum was red near the transverse colon and the loops of small bowel were liberated. The cyst as then gradually loosened far as feasible from its attachment to the mesentery. The loop of jejunum here shown was thickened but the operation seemed to be normal. A glance at Fig. 8 shows demonstration that the mucous coat was much thicker than usual. The mesentery of the jejunum remarkably enlarged lymph gland.

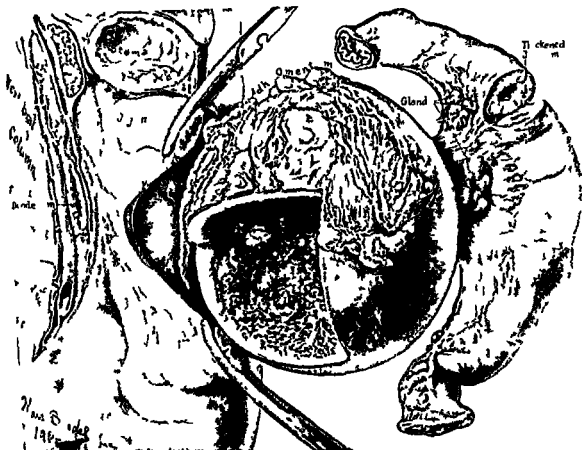


Fig 8 Tuberculous cyst of the mesentery of the jejunum. Resection of the jejunum together with the cyst. Temporary recovery. The right half of the drawing showing the mesentery cyst and the jejunum is a accurate portrayal of the specimen removed. The left half gives a more or less schematic representation of the relation of the cyst to the body. The cyst was spherical had definite basal mesenteric attachment about 3 x 3 mm and as covered with greatly thickened and matted membrane. The cyst wall lined from 2 to 3 mm thick more than the mesentery. The inner surface presented

the worm eaten appearance and the pus was odorless rather than greenish yellow in color. At the cut ends of the jejunum the mucosa practically normal but a section near the center of the loop shows marked thickening of the bowel wall together with much narrowing. As shown in the illustration, the glands of the mesentery are considerably enlarged. The ends of the bowel which were held by forceps were closed and lateral anastomosis was then made. This was a rather difficult procedure in account of the brittleness of the remaining portion of the jejunum.

With a few hours after operation the child was carried out on the grandstand and there she remained throughout her sojourn in the hospital. She steadily improved and had no abdominal complications whatsoever. About two weeks after operation a partial facial paralysis was noted on the left side but this did not interfere with her recovery.

Fig 9 Nos 2, 236 and 20237 Sections through the wall of the sac showing the outer surface is composed of fibrous tissue poorly nucleated. In some places there is a laminated arrangement. At other points the fibers run in ill defined bundles. There is a good deal of hyaline transformation. As one approaches the inner surface there is a tremendous amount of

small round-cell infiltration and the tissue at certain points looks like ordinary granulation tissue having a very abundant blood supply. Where this granulation tissue exists the inner surface of the sac is covered with fibrin which has in its meshes small round cells and polymorphonuclear leucocytes. At other points scattered through the granulation tissue are giant cells. Some of these resemble tremendous plaques of protoplasm with rather deeply staining nuclei scattered through out it. At other points are round or oval areas of protoplasm with oval or vesicular nuclei arranged chiefly around the margin of the large cell. At other points are tremendous giant cells surrounded by

small round cells or separated from the round cells by a zone of epithelial cells. In other words the picture is that of typical tuberculosis. In some places ten to fifteen giant cells are visible in one field. This is without doubt a tuberculous cyst of the mesentery of the jejunum. Section from the growth in the small bowel failed to show any evidence whatsoever of tuberculosis.

In four or five weeks the patient was walking well and was going from her home to the John Hopkins Hospital to receive electrical treatment for the facial paralysis. She came to see me at the office shortly before the summer vacation.

Dr. Goldberg tells me that during the summer her appetite was good and that she gained four pounds suddenly about two months after the operation. She was taken with severe headache which at first was occipital but which later extended all over the head. On the next day when Dr. Goldberg saw her she was in a semi-comatose condition was irritable and cross and wished to be let alone. The light seemed to hurt her eyes and she did not care for food and water. The pupils were dilated and gave little or no reaction to light. The respirations

were rapid the pulse was quick the temperature 99.4. The heart and lungs were normal the abdomen was tympanitic. The child lay with her limbs flexed and with her face away from the light.

She remained in this condition for several days. She was obstinately constipated. After the bowels had been emptied she showed some improvement for a few hours but soon lapsed into her former condition. Some difficulty was noted in swallowing. This gradually increased and during the last two days the child refused all nourishment. Finally she became comatose and died. Three days before death partial opisthotonos was noted. There was back and traction of the head but the knees were not drawn up.

Dr. Goldberg was unable to get an autopsy but the clinical picture coupled with the abdominal findings at operation strongly suggested tuberculous meningitis as the cause of death. A tuberculous condition of the meninges is little to be wondered at when we remember the massive primary focus of tuberculosis in the mesenteric cyst.

POINTS IN THE SURGICAL TREATMENT OF ACUTE INTESTINAL OBSTRUCTION

BY SAMUEL J. MIXTER, M.D., Boston

In 1912 Dr. McLennan read before this society a most thorough and interesting paper on Intestinal Obstruction.

The discussion of the paper occupies in the proceedings much more space than the paper itself although the subject of the use of eserine occupies an undue amount of space. At the same time I feel that the last word has not been said on the surgical treatment of acute obstruction and it is to emphasize a few of the important points that I venture to present this paper which is suggested by a study of a very considerable number of acute intestinal obstructions occurring in our private practice within the last five years. These cases are forty-two in number and do not include any cases of chronic obstruction from whatever cause. They are as follows: Cancer in the large intestine 22 adhesions 12 megacolon 2 gall stone ileus 3 omphalo mesenteric band 3.

Just a word on the indications for operation. Whenever it seems probable that the bowel

is mechanically obstructed the abdomen should be opened at once. It should always be remembered that the symptoms come earlier in obstruction of the small intestine than in the large and that less time is needed for severe lesions of the bowel in the upper part of the intestinal tract. One point that is emphasized in the discussion referred to was the necessity of emptying the bowel above the constriction in cases where there was considerable or great distention. In late cases where there is danger of paralysis of the muscular coat or where it is already present this may be done by the use of a tube tied in for a period sufficiently long to insure the return of the intestine and its contents to a fairly normal state. In the large intestine the opening may remain for practically an indefinite time without damage and the opening if properly made will generally close of its own accord. In the small intestine however a long standing opening means starvation of the patient a terrible irritation of the

skin and a difficult and dangerous surgical procedure for its relief. Some method should be devised in these cases that will make the reestablishment of the canal simple and under the control of the operator. In several cases I have been able to do this by stitching the walls of the small intestine together for three or four inches thus making a sort of double-barreled gun with its opening on the surface. A pair of clamps applied later in the old fashioned manner of cutting the spur is safe and generally is sufficient for the free passage of the fecal stream and the spontaneous closure of the external opening. If properly done this procedure is a practically safe one although it may be said that it is in a way working in the dark. If the external opening does not entirely close the bowel is able to pass along most of its contents and a comparatively slight and safe operation completes the cure. The higher up the obstruction the more dangerous is the artificial anus while the risk of auto-intoxication from an immediate reestablishment of the fecal flow is less. Even an extensive resection and immediate anastomosis may be done with less danger than in the lower gut.

It is in the cases of obstruction in the small intestine caused by dense inflammation adhesions or knots which are not infrequent that lateral anastomosis sidetracking the obstruction gives a most satisfactory and brilliant result. The operation is not always an easy one for the intestine above with its long standing obstruction is often enormously hypertrophied sometimes with walls as thick as sole leather and the size of the forearm while the intestine below to which it must be united may be no larger than the little finger. In spite of the difficulties however success is almost certain even where acute symptoms have been present for some days. I have had a considerable number of these cases and they have all recovered promptly and remained well for years.

For some reason that I never could understand even the large tube tied into the large intestine will not always work and the distention will persist. The intestinal tract unfortunately is not a stiff tube with regular coils and though the surgeon may be a good

'plumber' he will occasionally fail on account of the nature of the tube on which he is working.

Obstructions that are near the cæcum are to my mind most difficult to manage. The obstructed small intestine must be given an outlet. For reasons stated above an enterostomy opening in the small intestine is unpleasant and troublesome complicating the subsequent operation for radical cure on the affected portion of the bowel. A sidetracking operation by lateral anastomosis between the ileum and the sigmoid or some other convenient part of the large intestine is most useful in fairly early cases but even here the immediate result is not always as good as an enterostomy and where there is much distention it is often found on reopening the abdomen that many troublesome adhesions have formed which may make a radical operation difficult. I have observed this condition in a number of cases where distention had been the factor whereas if there has been but a little distention these adhesions have not been present. Whenever obstruction in the large intestine is well away from the cæcum a cæcostomy is the surest method of relief and gives the least trouble in a subsequent operation.

And now in regard to the method of approaching the obstructed bowel. One of the greatest advances in the treatment of this most serious condition is the use of spinal anesthesia. Although a simple enterostomy may be done and should be done with infiltration anesthesia this does not as a rule admit of a thorough enough examination of the intestinal tract and location and examination of the point of obstruction. Chloroform ether gas and oxygen unless given to a point of complete relaxation do not permit the examination of the abdominal contents without undue violence. We have all seen intestines forced violently out of our incision becoming congested and ecchymosed and even after they have been emptied and the operation completed there is great difficulty in returning them to the abdominal cavity against the rigidly contracted abdominal muscles. With novocaine spinal anesthesia we have a method which gives

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THE RADIUM TREATMENT OF FIBROID TUMORS¹

BY HOWARD A. KELLY M.D. BALTIMORE

HEREWITH present a series of thirty six cases of fibroid tumors of the uterus treated by radium from March 18 1913 up to October 1914. I have excluded from this plan of treatment only cases which presented some serious complication such as pelvic inflammation ovarian growths or obstructive symptoms. This list refers only to patients treated in a private hospital in Baltimore.

The method of treatment employed has been a dilatation of the cervix and the introduction within the uterine cavity of amounts of radium varying from 30 to 724 mg. In some of the larger tumors an additional massive treatment has been given through the abdominal walls. I omit one case included in a former list in which the treatment was applied within the cervix and not within the uterine cavity. In this case the symptoms of excessive flow continued and I operated upon the patient doing a supravaginal amputation. The effort has been made in each case to treat the uterus and the tumors avoiding as far as possible treating the ovaries unless the patient was near the menopause or past it. X-ray therapy is applied the radium being screened by platinum or platinum and glass further enclosed in a rubber tube. In giving massive abdominal treatments the radium is further enveloped in cotton and gauze in order to give distance to the treatment.

The patients have varied in age from thirty to sixty seven years the average being forty two and one half. Divided into three groups eleven were between thirty and forty twenty one between forty and fifty and four over fifty.

The tumors have varied in size from small ones about 5 cm in diameter to massive growths extending close to or well above the umbilicus. The large tumors were more or less physical.

The indication for the operation in a surprising number of cases was hemorrhage

either menstrual or both menstrual and intermenstrual. Occasionally the complaint was dysmenorrhoea and pain or simply pain in the lower abdomen or again the patient came because she recognized that she had a growing tumor.

Tumors of all kinds have been treated and the submucous and subperitoneal and even the pedunculate have seemed to respond as well as the interstitial. All the patients are under observation being written to or examined with the aid of the family physician or seen and examined personally.

The results in every case but one have been either the shrinkage of the tumor or its complete disappearance. This latter happy terminus has not seemed to depend on the size of the growth as for instance one in the list reached three finger breadths above the umbilicus one was just below the umbilicus and another was 15 cm in diameter. The desired results were secured in periods varying from two months to a year or a year and one half. In some of the cases still under observation some months after treatment the shrinkage still continues. One of the most striking effects is upon the menstrual function where the radium can in all cases be depended upon to bring about complete amenorrhoea. In the one case in the list which has recently been operated upon and in which radiation failed although the tumor did not shrink in size complete amenorrhoea was secured. If care is taken to avoid giving too large a treatment it is possible in some cases especially with young women to avoid amenorrhoea (four instances in list). With this object in view a large treatment is given over a short period of time.

The amount of radium used has varied considerably as we have been busy working out just the proper dosage. As an ideal dosage we would suggest $\frac{1}{2}$ gram of radium element for two hours. We are at present working diligently attempting to establish some other gauge of treatment than the

thorough relaxation. The shock is enormously less than with a general anæsthetic on account of the ease with which the intestines are handled and the operation can be easily completed and the patient in bed before the anæsthesia wears off. It is well known that under spinal anæsthesia and this is a most important point the large intestine will often empty itself on the operating table through the relaxed sphincter and the surgeon and patient be saved a great deal of later trouble.

As soon as the abdomen is open if the point of obstruction is not easily and immediately discovered the distended loops should be emptied. After a trial of various methods I have settled upon the trocar and purse string suture as being the safest and most effectual. A number of such punctures may be made with slight loss of time with little cooling of the peritoneum and no shock to the patient.

When I began the use of a stiff tube or better a fairly stiff rubber tube I felt that I had found the perfect method of getting rid of the intestinal pea soup and gas but I soon found that the shock to the patient was out of all proportion to the advantage gained.

A method of emptying the large intestine that I have found most effectual in certain cases is the use of a long preferably fenestrated rectal tube which is introduced by an assistant and guided by the hand of the operator may be easily pressed even as far as the cæcum. The intestine having been partially emptied it is possible by touch and inspection to find the point of obstruction and

its nature and the operation is completed before the spinal anæsthesia has worn off. In many cases the surest way to save life is by the establishment of permanent colostomy but this should never be done unless the patient understands fully what the operation means. Personally I am willing to take a very much larger risk of life in order to avoid this very unpleasant result. Many cases of artificial anus are so made that they can be fairly easily managed but my personal feeling is that any risk of death is preferable. If an artificial anus should be made remember that the umbilicus is the point which moves less with muscular action than any other point of the abdomen and the nearer the opening can be made to this point the more readily can an adequate apparatus be fitted to the patient. A large loop of intestine should be brought out so that the abdominal wall can be stitched together through a hole in the mesentery and thus the two ends are later separated in such a way that the feces in the upper end cannot enter the lower part of the bowel.

It should always be remembered that in the late cases more lives are lost by doing too much than too little. The emptying of the bowel and drainage of the intestine are two important factors in addition to speed.

Early operation is easy and comparatively safe. In late cases the condition is a very fatal one and we shall always have a certain number of these desperate cases either from the objection of the patient to operation the delay of the physician in charge or our own mistake.

radium hours that is to say estimating that 100 mg inserted for four hours is to be called a 400 mg hour treatment and equal to a dosage of say 25 mg for 16 hours which also makes a total of 400 hours. The physiological and pathological effects are by no means the same.

The present obvious factors are the size of the tumor, the position of the ovaries, the amount of radium used, the distance of the radium from the tumor and the ovaries and the time over which treatment is continued.

The sensitiveness of the tumors to radiation varies extremely, some of them responding almost like round celled sarcomata, shriveling away rapidly. As yet no real dangers have developed in connection with the treatment and with the methods more recently in use, viz. that of a big dosage and a short exposure, the discomforts are very slight or none at all. While on the other hand with a small dosage and long exposure abdominal discomforts were sometimes produced lasting several weeks with a leucorrhœa more or less persistent. In about 50 per cent of the cases where amenorrhœa has been produced there have been no hot flushings or nervous symptoms, although these menopausal sequelæ have been marked in some cases.

The best answer to the question regarding the liability of overlooking malignancy in some of these radium treated fibroids is taken from Kronig and Gauss' statistics of several hundred fibroid tumor cases treated with X-ray where not one developed any malignant disease subsequently.

The radium treatment is ideally adapted to anæmic and weak patients.

I fully realize that in presenting so short a series the results are suggestive rather than conclusive and that further experience is necessary before we can speak with confidence as to the outcome in any given case. I suggest therefore the following tentative conclusions:

1. Massive radium treatment of uncomplicated fibroid tumors is the best plan as it stops the excessive flow, sometimes in younger women it regulates it without stopping it. Radium reduces the tumors in almost every instance, relieves pressure symptoms and even causes large tumors to disappear.

2. A fibroid tumor is not a malignant growth, therefore any method of treatment which will give entire relief to the symptoms is the best method provided it will at the same time avoid the various risks of an operation. If radium is tried and fails the operation can then be undertaken without any added risk. Touching this last point I must add that while a recent radium treatment often makes more difficult the subsequent radical extirpation of a cancer of the cervix, there is no reason to expect this result in fibroid tumors.

3. It is our belief that with increased experience and improved technique it will be possible to relieve every patient of hæmorrhages and in most instances to do away with the tumor (let us say roughly speaking in 9 cases out of 10) and that without serious discomfort, risk or confinement to bed for more than one or two days. Patients too anæmic and weak even for an intra uterine application of radium can be treated through the abdomen exclusively.

The frequency was usually first noticed at night. I believe this symptom becomes most marked in cancer involving the entire prostate. A number of our patients voided every few minutes. Difficulty in urination in cases of cancer is not as prominent a symptom as in the cases of benign hypertrophy. It was present however in all but 14 of the 93 patients. In 3 there had been complete retention and a suprapubic stab drain had been made previous to their coming to our clinic for examination. One patient had suprapubic drainage made two years before coming for operation and had passed no urine through the urethra during that time. Only two of our patients complained of dribbling. Dribbling was more common in the cases of benign hypertrophy.

Blood in the urine. Hematuria was present in 21.9 per cent of the cases. One patient had noted blood in the urine every day since the symptoms began three years previous. In most of the cases the amount of blood was small and noted only occasionally. It was a comparatively late symptom being noted at most only a few months before the patient came for examination. In none of the malignant cases was there a sharp hemorrhage and the passing of clots which occasionally occurs in benign hypertrophies. Bleeding did not occur in any of our early cases.

Forty nine of our patients had used a catheter nineteen had used it for one month or less. In several instances it had been used only once or twice. Three patients had been using a catheter for about one year, one for two years, one for four and one half years and one for seven and one half years. One had had permanent suprapubic drainage for two months and one for three months.

It has been interesting to note but difficult to explain that in our cancer case as a group the specific gravity of the urine has been unusually low in many instances, ranging from 1.002 to 1.005 in individuals generally in good health.

A side from the character of the pain which in cancer is apt to be constant and independent of micturition in the symptomatology of cancer in the early stages is almost identical with that of benign hypertrophy and the

physical examination may reveal the first signs of malignancy.

Physical findings. A general physical examination usually shows a healthy robust individual. Rectal examination may reveal a small prostatic gland or if hypertrophy is associated with the cancer the enlargement may be quite marked. If on palpation the surface of the prostate is rough with hard nodules it is always suspicious since in the benign cases the prostates are nearly always smooth unless there is associated inflammation or calcareous deposits in the substance of the gland. In benign cases they are often lobulated though their surfaces are smooth. In cancer if the surface is smooth the prostate is very hard.

It is sometimes impossible to discover malignancy when it is associated with hypertrophy or to distinguish malignancy from chronic inflammatory prostatitis. In six of our cases the gland was soft due to the fact that adenomatous hypertrophy predominated and the cancer was not felt. In many of our cases a hard nodule could be felt in one lobe while the other showed no changes.

The characteristic cystoscopic picture is a small prostatic bar unless adenomatous hypertrophy exists at the same time. The mucous membrane of the urethra or bladder is not ulcerated except in the late cases. Cystoscopic examination is of great aid especially in ruling out those cases too advanced for operation. However this examination should not be made in evidently hopeless cases since the reaction following may be quite severe.

The chief factor in the clinical diagnosis of cancer of the prostate whether or not it be associated with other conditions is an irregular hard feel to the surface of one or more lobes of the gland. The type of pain may be suggestive but is not diagnostic.

A study of our specimens removed at operation showed that in about 75 per cent the cancer was associated with hypertrophy and in the remaining 25 per cent the cancer occurred in prostates in which we were not able to find evidence of hypertrophy. In the group of cases associated with hypertrophy the symptoms and findings were often those characteristic of benign hypertrophy and in several

CANCER OF THE PROSTATE

By E. S. JUDD, M.D., ROCK SPRING, Md.
From The Mayo Clinic

IT is difficult to estimate the frequency of the occurrence of cancer in the prostate from operative records since the cancerous tumor in this gland is often very small and may not produce local symptoms. Moreover in many instances the metastatic lesion is discovered before the primary focus. It is generally reported however that one case in five (20 per cent) of prostatic enlargement causing obstruction in old men is due to cancer. The records from our clinic will bear out this percentage.

There have been 878 prostatectomies performed in the Mayo clinic up to the present time December 1, 1914. In 93 of these cancer was found. In addition to these (from January 1, 1910 to December 1, 1914) 84 cases were diagnosed cancer but were not operated on because they were too advanced for any operative procedure or because the chances for cure were not good enough to warrant interference in individuals who were fairly comfortable.

A similar ratio of occurrence is found in the autopsy records. Kummell (1) reports that in 38,472 autopsies there were 204 diseased prostates, 43 or 21 per cent of which were carcinomatous while Gebele (2) in a report on the material at the Pathological Institute of Munich says that 38 per cent or more than one in three cases of prostatic lesions were cancerous.

Age of the patient. In our series of 93 cases operated on the youngest patient was fifty-one years of age and the oldest eighty-two.

Number between 50 and 60 years	34
Number between 60 and 70 years	36
Number between 70 and 80 years	
Number between 80 and 90 years	

In our series of non-operated cases there were a few patients just under fifty years of age but the cancer was too far advanced for operation. The age incidence gives no suggestion as to the nature of the trouble since it corresponds very closely to that of benign hypertrophy.

Symptoms. In many cases the symptoms do not differentiate early cancer from adenomatous hypertrophy. The pain associated with cancer is usually much more marked in the region of the prostate. It is more constant and is not necessarily associated with micturition. This localized pain is supposed to be due to tension within the capsule. It becomes more marked locally and as the disease progresses also radiates into the extremities and to the back. Pain of this character does not occur in other lesions of the prostate and is somewhat characteristic of cancer.

There is a marked variation in the duration of symptoms. A gradual onset growing steadily and rapidly worse without attacks of acute retention would seem to favor malignancy. The onset and length of time of symptoms may be identical with the ordinary case of benign hypertrophy. Nine of our patients had had symptoms only six months while eight had been troubled more than ten years, two of these more than fourteen years. More than half of the patients had had trouble between one and four years. In all probability in patients having symptoms for a number of years the early symptoms are due to hypertrophy which often occurs at the same time.

DURATION OF SYMPTOMS

6 months or under	9 cases
6 months to 1 year	20 cases
1 year to 2 years	4 cases
2 years to 3 years	7 cases
3 years to 4 years	9 cases
4 years to 5 years	3 cases
5 years to 6 years	3 cases
6 years to 7 years	4 cases
7 years to 8 years	5 cases
8 years to 9 years	1 case
9 years	1 case
10 years	1 case
11 years	

Frequency of urination was one of the most prominent symptoms and usually the first to appear. In many cases frequency and difficulty were noted at about the same time.

Patients still living after 6 moths 3
 Patients still living after 1 year 7
 Patients still living after 2 years 4
 Patients still living after 3 years 3
 Patients still living after 4 years 2
 Patients still living after 9 years 1

The patient who is living and free from symptoms nine years after the operation had a very small cancerous nodule removed. Many of the patients living at the present time are entirely free from symptoms. Three who were operated on within the year yet more than six months ago are well. In the cases of recurrence hematuria was one of the first evidences of the recurrence. Difficulty

of urination was also an early symptom and became rapidly marked necessitating suprapubic cystotomy in a number of cases. Several patients lived more than three years without evidence of trouble when there was a return of all of their symptoms.

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THE WISDOM OF THE PAST A PROPHECY OF THE FUTURE¹

BY JOHN WISLEY LONG M D FACS GREENSBORO NORTH CAROLINA

THE coming of the Southern Surgical and Gynecological Association into the old North State marks an epoch in the history of both state and Association. For the state I will say we appreciate your coming into our midst. With the exception of the Charleston meeting twenty years ago when the lamented Cornelius Kollock was president this is the only time the Association has ever gone to the state from which it chose its presiding officer. Therefore I may add a personal note of gratification.

Your well nourished features and elegant apparel do not indicate that you have been feeding upon husks; nevertheless we have killed the fatted calf and brought forth the wedding robe and ring indicating thereby that having come once we shall always claim you as our own and want you to feel that we are yours.

This meeting shall we trust not soon be forgotten by the Association. Be it known unto you friends that you stand upon soil made sacred by every token that appeals to one's patriotism, love of home and native land. For instance to have been one of the original thirteen colonies is no mean distinction. Without invidious comparison sup-

pose one could have the choice as to where he should be born, do you imagine he would hesitate for a moment to choose a state whose sons unsheathed the sword to gain their independence, who defied royal tyranny even though it be called treason rather than a state however great whose star has been added to Old Glory like a belated afterthought?

Glancing back as far as the Revolution we find a number of important engagements were fought in North Carolina and the decisive blow that sent Lord Cornwallis reeling on to Yorktown where he surrendered to Washington was struck by General Nathaniel Greene at the battle of Guilford Court House near the center of the state.

Passing rapidly to the period of our Civil War which some of you remember and a few saw service in, if you will pardon a personal reference I may say that I was born amidst the mutterings of the ominous war cloud which burst into that most fearful internecine conflict the world had ever seen. Into that holocaust North Carolina sent more men and boys than she had voters over forty thousand of whom never came back. Notwithstanding the gruesome price she paid it shall ever be the proud boast of the old North State that she was first at Bethel

instances the cancer was not discovered until the specimen had been carefully sectioned. In these cases the malignant process apparently always started in the posterior lobe and often was distinctly separated from the rest of the gland which was not involved. The tumor produced by benign hypertrophy in some of these cases is quite as readily enucleated as in the ordinary case and unless the posterior segment is enlarged the malignant process may easily be overlooked. This error has occurred once in our experience. A large bilateral and median hypertrophy was removed in the ordinary way. At the time of the patient's death a few weeks later the wounds were healed and the functional results were good considering the short time that had elapsed. At autopsy a small hard cancer entirely capsulated was found in the posterior lobe. I believe that the cancer in this case had nothing to do with the fact that the patient did not live longer but the experience served as a good lesson and since that time in every supposedly benign case after removing the hypertrophied lobes the remaining posterior lobe and posterior part of the capsule is carefully palpated for any evidence of hard and irregular nodules. If the hypertrophied part is more firmly attached posteriorly or shells out with difficulty there is always suspicion of cancer. If the cancer alone exists in the prostate it is usually easier to distinguish. The tumor is small and hard and seems to involve the entire gland. In such cases the patients have considerable constant pain not associated with urination unless there is tendency to stricture a condition which is not uncommon. The growth does not often extend into the bladder so that from a suprapubic exposure the bladder may appear quite normal. If an effort is made to pass a finger down into the prostatic urethra a firm hard rim is felt and if we try to remove this rim it is found to infiltrate into all the surrounding structures and cannot be removed except in small pieces. These cases are the least favorable for operation. Often in the apparently early cases the malignancy extends beneath the trigone into the seminal vesicles and as high as the ureteral orifices.

Treatment Radical operations for this condition have gained favor very slowly not because it is impossible to remove the growth with a reasonable degree of mortality but largely because it is impossible to do a thorough radical removal of the cancerous prostate and the adjoining part of the bladder without completely destroying the mechanism of urinary control. We must also consider the fact that the conservative prostatectomy may cure a certain percentage of the early cases and at the same time give satisfactory functional results. Before undertaking the radical operation the patient should understand that he will have no control of his urine. We see very few people who are at all comfortable with a total incontinence of urine.

Patients who are incurable but fairly comfortable either with or without the catheter should not be operated on though certain of these who have not used catheters should be advised to do so since they may be made more comfortable by its use. When the patient's symptoms are extreme or the use of the catheter causes great pain even if the prospects for complete cure are not good they should have a palliative operation. In many of the cases the obstruction to urination is due to a benign hypertrophy. Removing the obstruction and also a part of the cancer will entirely relieve patients for a time and they will be much more comfortable than with any other procedure.

The mortality under these circumstances is little more than in the benign cases the functional result is quite as good usually the wounds heal just as promptly and the pain is entirely relieved. Many of these patients live several years in comfort. Kummell states that these patients receive benefit from X-ray and radium.

End-results Through correspondence and personal communication we have been able to trace 82 of the 93 patients operated on. In all of these an ordinary prostatectomy was done either by the suprapubic or perineal method. Of these—

- | | | | |
|----|-----------------|----------------|----------|
| 31 | lived more than | 3 | years |
| 31 | lived more than | 3 | years |
| 31 | lived more than | 3 | years |
| 4 | died | than the first | 6 months |
| 1 | died | time | known |

spear eighty three years (1602) before Newton announced the law of gravitation (1685) makes Cressida to say

But the strong base and building of my love
Is the very center of the earth
Drawing all things to it

Listen to Tennyson in Locksley Hall written in 1842

For I dipped to the future, far as human eye could see
Saw the vision of the world, and all the wonder that would be

Saw the heavens fill with commerce, argosies of magic sails
Plots of the purple light dropping down with costly bales

Heard the heavens fill with shouting, and there rain'd a ghastly dew
From the nation's artery, as grapes from the central blue

Far along the world's wide whisper of the south wind rushing warm
With the standards of the peoples plunging through the thunder storm

Till the war-drum throbb'd no longer, and the battle-flags were fild

In the Parliament of man, the Federation of the world

Such writers may be said to have walked in the twilight zone of prophesies which are now being rapidly fulfilled. Sir Humphry Davy walked in the twilight zone of nitrous oxide anesthesia in 1800. Forty four years later the Hartford dentist Wells made practical application of this knowledge. Faraday walked in the twilight zone of ether anesthesia in 1818 but not one of those who came after him stepped into the brilliant light of applied science till in March 1842 Crawford W. Long of Jefferson Georgia anaesthetized James Venable with sulphuric ether and excised a cyst from his neck.

Without question many men must have walked in the twilight zone of ovariotomy. But it remained for McDowell the Kentucky village surgeon in 1809 to remove a sixty pound cyst from Mrs. Crawford without anesthesia in his office while the mob on the outside howled for his blood to dispel the twilight of urgial impossibility and place another star in the armament of professional achievement.

Look at Sims, born and educated in South Carolina and practicing medicine at an Alabama crossroad. He is now and always will be justly called the father of modern

gynecology. Note his despondency in his early years see him tear down his tin sign and throw it into the well in the back yard. Observe him sell out his little belongings and try to go into the clothing business. Think of it! Marion Sims selling clothing! Picture in your mind his first operation on Anarcha using a bent spoon handle for a speculum. He fails but he tries again and again till twelve times he has failed. Oh what a moving picture that would make! But look once more he is walking down the street. His eye chances to light upon a tiny spiral lost perhaps from an old suspender. Inspiration seizes him. The scales fall from his eyes. He no longer walks in the twilight of failure. He sees clearly. If he only had a sister wire as fine as that bit of brass spring he could cure Anarcha's vesicovaginal fistula. He has it he succeeds! Eureka! See this gavel made from a leg of Sims operating table bears mute testimony to the greatness of its illustrious master!

The twilight zone! It is only the old old story of genius groping in the dark for the unknown. It is the gift of prescience in the awakening! Tyndall said. The greatest discoveries of science have been made when man has left the region of the seen and known and followed the imagination by new paths to regions before unseen.

Varro in 127 B.C. clearly taught that infectious diseases were caused by microorganisms. Two centuries before Koch became famous through his brilliant researches in bacteriology. A. von Leeuwenhoek of Delft looking through a simple lens of short focus discovered bacteria. It was no fault of the Dutch scientist that the world was slow to appreciate his unrivaled contribution to science.

The profession gives credit to him who gets there first. The first anesthesia the first ovariotomy the first cure of vesicovaginal fistula the first hip-joint amputation in America done by Brashear of Kentucky in 1806 the first removal of half of the lower jaw by Deadrick of Tennessee in 1810 the first total removal of the clavicle done by

farthest at Gettysburg and last at Appomattox. Into the history of her soldier heroes the state has written the legend inscribed upon the stones over the Spartan dead who died at Thermopylae. Stranger go tell in Lacedaemon that we lie here in obedience to her command.

But it is not of deeds of valor or exploits of war that North Carolina would boast. Rather would she be known for her victories of peace. In common with the other southern states the war left her impoverished beyond description, robbed of civil liberty, her property confiscated, her fair land despoiled, her slaves sitting in legislative halls. Surely she was cast down but not destroyed. Then it was her valiant sons arose in their might and disfranchised the ignorant, the incompetent, the vicious, the impossibles, and reestablished the true citizenship of the state. This act has stood the test of the Supreme Court of the land.

While North Carolina is distinctive in many ways she is but a type of the South. Undisturbed to any great extent by the flotsam and jetsam of other lands the South developed and retained customs, conditions, conventionalities, convictions, all her own. It would be interesting to study these characteristics but it would lead us too far afield. We are concerned in this connection only with the southern surgeon.

Those of you who live in the large cities of the North and West cannot appreciate the disadvantages under which the southern surgeon labored. If this were true in antebellum days it was a hundredfold more so following the war. Isolated, limited in clinical and laboratory facilities, practically denied membership in the national special societies, his mental development hindered because of lack of opportunity, the old time southern physician was thrown back upon his own resources. No one questions his native ability, environment constituted the shackles that clogged his feet. His was the task to overcome obstacles. Often he had to make brick with out straw. But he remembered the axe over the old Norseman's door and the slogan to find a way or make one. He made one, yea many one of which leads to this glad

hour and occasion and in the making he laid the foundation so broad and deep that those who follow may find safe and easy footing.

Even a superficial knowledge of the southern surgeon convinces one that he possessed superb qualities and his history is illuminated with evidences of his ability to do great things. Despite the limitations of environment he encompassed herculean tasks. Many brilliant examples are well known where he burst the bonds that would have circumscribed a weaker man, performing exploits that make him the envy of the world. A perspective reveals him unearthing great discoveries, doing unprecedented operations, formulating undying principles, daring to do deeds of heroism!

However let it be distinctly understood that we make no claim to superiority of either blood or brawn or brain. We would draw no disparaging distinctions. Rather do we rejoice with exceeding great joy in the ability and success of every member of our profession under the stars and stripes in fact throughout the world. But as a faithful messenger as one who under the providence of God has been spared to tell the tale, I must give credit to my compatriots who deserve it, whose lives stand out as beacon lights along the pathway of history, whose works have mitigated pain, alleviated disease and added years to the life of womankind and that of man as well.

If we may judge by what they accomplished many of these men were so far in advance of their times as to appear to have possessed the knowledge of prescience. As is well known the gift of prescience was granted to the prophets of old but in a material sense was by no means confined to them. One of the books that enthralled my boyhood days was Jules Verne's *Twenty Thousand Leagues Under the Sea* written several years (1869) before Holland planned his first submarine (1875).

Sometimes the poet gets a glimpse of the deeper things of life, his vivid imagination giving him vision denied ordinary mortals, enabling him to foreshadow that which later becomes clear to us all. The immutable Shakespeare

he developed remarkable ability as a surgeon as an organizer as a writer as an experimenter as a leader among men that he became famous before he was forty years old was no surprise I am sure to those who knew him in his college days

Another man who made a deep and lasting impression upon me in the halcyon days of the long ago as upon all with whom he came in contact was the late W D Haggard Sr M D father of our distinguished secretary Incidentally allow me to say the difference in the teaching of medicine under the old régime and the new is strikingly shown by the fact that the first lecture I heard (1800) as a medical student was by Doctor Haggard Sr and the subject was the treatment of secondary post partum hemorrhage As a teacher Dr Haggard was clear cut exact honest He was far reaching in his knowledge of men and things He was an arduous student always His devotion to medicine and surgery his enthusiasm were catching To the young men he was a safe and wise counsellor To come in contact with him was like steel approaching a powerful magnet his influence was irresistible When the Davises and Dixie Douglas and John Wesley Gaines for many years now a member of Congress and W H Park who I understand is the most influential white man in China today and upon whom the government recently conferred the Loh Tung Chia Ho Tsang or the Golden Grain decoration of the sixth order and many others including your humble servant sat beneath the spell of Haggard's teaching he was already approaching the chloroform age His was one of the most striking examples of a man in advanced years who was ever on the alert to learn all that was new and best in his profession

I have it at first hand that the movement which culminated in the present organization was first called the Alabama Surgical Association The prime movers were Drs W E B Davis J D S Davis H P Cochran and H M Rosser and a few others Dr W E B Davis took counsel with his old teacher Dr Haggard who advised that gynecology be included which was accordingly done It soon developed that the new

organization was considered by certain men in authority in the State Medical Society to be antagonistic to the latter This feeling did not render the movement popular Before the year was out it became patent that the plans must be changed or disaster would probably overtake the new enterprise whereupon Dr Davis encouraged by the advice of Dr Haggard invited a considerable number of representative men throughout the South to meet with the Alabama Surgical and Gynecological Association in Burningham to consider the advisability of organizing an association embracing the entire South Only a few of those invited responded in person about eighty wrote letters of approval The result was the launching of the Southern Surgical and Gynecological Association with Dr Haggard as president and Dr Davis as secretary

At the end of its first year the new association was still wabbling upon its first legs The issues were in doubt perhaps more apparent than real At this juncture Dr Haggard telegraphed Dr Hunter McGuire who was not present at this or the former meeting asking if he would accept the presidency Dr McGuire who could sight at long range without the aid of an aeroplane promptly replied that he would Davis in his Presidential Address (1903) says When it became known that Dr McGuire had accepted the presidency and was in sympathy with the organization its success seemed fully assured It may very pertinently be asked What organization could fail to go when inspired by the enthusiasm of Davis censored by the wisdom of Haggard and vitalized by the magic touch of McGuire?

What I have said is the briefest possible epitome of the history of the origin of the Southern Surgical and Gynecological Association Also the credit given to the promoters is meager compared to the magnitude of their labors But what about those who contributed to its formation and growth whose names have not as yet even been mentioned? It is to be regretted that the proprieties of good usage will not permit us to discuss those who are still with us in the flesh

McCreary of Kentucky in 1813 the first successful ligation of the innominate artery by Smythe of New Orleans in 1864 *et al*

But I must hasten on. Moreover priority is by no means the only claim the southern surgeon has upon our appreciative memory. The limits of this address forbid anything more than the barest mention of a very few of the men whose services in time of war and peace have forever endeared them to our people. There is Paul F. Eve famous in the Polish War and our own Civil War and no less great as a teacher of surgery. Twice was he called to the University of New York once to succeed Valentine Mott. Wattleuer of Virginia did seventy nine lithotomies with only four deaths (5 per cent). Briggs one of our founders and an incomparable teacher of surgery four times called to other schools did two hundred and seventy four lithotomies with only eleven deaths (4.7 per cent). Dudley of Kentucky did two hundred and twenty five with three deaths (1.33 per cent). Winslow of North Carolina did ninety nine with one death (1 per cent). All this and infinitely more before the days of aseptic surgery and some of it prior to anesthesia. Vandell another of our fellow was a surgeon of unusual ability and distinction. Robert Batty's name deserves to go down with the world's celebrities.

I said there were heroes among southern physicians. Two instances only must suffice. When I was a student in Vanderbilt University Professor Thomas Menees would each year bring his grandson four or five years old to the lecture hall and the little fellow upon the speaker's desk and with tears in his eyes tell the story of his son the boy's father laying down his life in his efforts to rescue the yellow fever sufferers in Memphis in 1876. T. O. Summers who went with young Menees was spared to become one of our founders. McGuire tells us of kneeling beside a southern surgeon at Cold Harbor whose side had been torn away by a shell. When told that his wound was mortal the dying man replied "I am no more afraid to die than I was to do my duty."

But why prolong this list? The task is too great. I could not even call the roster

of the illustrious dead of the South though we omit the names of such men as Thomas and a multitude of other Southerners who went North or elsewhere and became leaders in their profession.

Like the independence of the Colonies the redemption of the South the achievements of our predecessors and many other good things that we enjoy the Southern Surgical and Gynecological Association was born of the exigencies of the times. Dr. Haggard our first president said in his address (1888)

It did not spring voluntarily into existence but was the outgrowth of necessity.

A true of most mortals especially those who start with large criminal development at natal day was not consummated without much pain and labor but once joy cometh in the morning when a man child is born let us forget all the unpleasant features in our rejoicing over present realizations and future possibilities.

As I read the history of books and men the formation of this Association was due in part to the desire in the hearts of certain young progressives for better things and in part to the wise counsel of older heads. The organization was hastened in no small degree and crystallized by the very antagonism which the movement engendered. It is of these men and movement that I wish briefly to speak.

It was my good fortune to have been a classmate of William H. B. Davis in the Medical Department of Vanderbilt University and the University of Nashville. I have many reasons for remembering young Davis in those early years one being that I had the temerity in common with a number of other reckless youths, to contend with him for the distinction of being valedictorian of our class. The test was a speech delivered by each contestant before a meeting of the student body under the supervision of a member of the faculty. It is only just to those ambitious young medicos my competitors to say there were orators in those days. The speeches over noses were counted and amid much acclaim Davis was declared elected to deliver the valedictory. That Davis later became distinguished that

manitarians know no geographical boundaries nor nationality nor creed either political or religious! To them there is no Mason and Dixon line! We be brethren in the truest sense of the word!

The Constitution as first adopted says

The object of this Association shall be to organize the profession of the South in the most efficient manner possible for the advancement of the sciences of surgery and gynecology. A few years later and ever since the same article reads. The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States. Note the difference. In the first instance to organize the profession of the South is stressed in the latter this feature is omitted altogether while the study and practice of surgery and gynecology among the profession of the Southern States is alone mentioned.

Now then in harmony with the wise changes that have already been made in this basic Article of the Constitution and in view of the fact that we are no longer provincial I recommend by virtue of the exalted position with which you have honored me that we drop the terminal words among the profession of the Southern States and let this Article read as it is in fact. The object of this Association is to promote the study and practice of surgery and gynecology.

In my opinion Article IV Section I which defines who may become members should be so amended as to prescribe the minimum number of years the applicant must have practised his specialty and the percentage of his work devoted to surgery or gynecology as the case may be. This section will of course include the plan adopted by the Council last year providing for applications and recommendations. I further suggest as being more in keeping with the dignity of this body that the designation Fellow be substituted for member wherever the latter occurs in the Constitution and By laws.

Important as is our Constitution and much as we revere it we possess something higher and better. Call it the *esprit de corps* or if you please the unwritten law. I can

best describe it by an illustration. Among the crown jewels carefully guarded in the tower of London there is to be seen a massive golden salt cellar. Now tradition tells us that with the nobility the salt cellar plays an important rôle. On the dining table the place where it is set marks the dividing line the guests of honor sitting above those not so distinguished must sit below the salt cellar. In the great annual three-day feasts of the Southern Surgical and Gynecological Association the salt is placed before every man's plate! Ours is a true democracy! I confidently believe that this feeling obtains with every Fellow whether he be from the South the North the East or the West.

In preparing for this meeting I read every presidential address and *In Memoriam* in the twenty six volumes of *Transactions* also much of the other data found therein. One cannot study these historical records without being impressed with the high order of ability the sincerity of purpose the exalted character of the men who made them. The *Transactions* taken as a whole bear testimony to a comprehensive understanding of the mission of surgeons and gynecologists of the inestimable value of organized effort of the demand for higher education and of the part incumbent upon this Association in the development of the science and practice of surgery and gynecology. The responsibility of maintaining this high standard rests upon us we could not shirk it if we would. It may be truly said that this Association is a heritage from our famous predecessors. I rejoice to believe that their mantle has fallen upon our shoulders. May we wear it worthily!

The American people have long since come to appreciate the greatness of the Virginia statesman who wrote the Declaration of Independence. As generations come and go and our institutions adjust themselves to the principles of that immortal document we see more and more clearly the wisdom the statecraft the prescience its author must have possessed. Those of us living today have inherited an abiding faith in Jeffersonian doctrines. We cling to them with every assurance that their embodied wisdom as shown by their adaptability to the neces-

Could we send a wireless across the Styx which according to Greek mythology flows seven times around the World of the Dead and ask Davis and Haggard and McGuire if they and they only deserve credit for this monumental Association we may be sure that the answer would come back somewhat after this fashion Nay verily there be George J Engleman and J McIadden Gaston and Bedford Brown and Cornelius Kollock and Richard Douglas and A M Cartledge and Manning Simmons and David W Yandell and Joseph Price and W W Potter and B L Hadra and H H Mudd and F T Meriwether and Chas M Rees and Roswell Park and T J Croxford and Henry F Campbell and Lehman H Dunning, and Willi G MacDonald and J C Munro and Jos T Jells and Jno C LeGrande and H P Cochrane and W B Rogers and John S Cain and Claudius H Mastin and James B Murfree, and Herbert N Nash and Wm R Iryor and Benj W Taylor and J T Wilson and Thaddeus A Reamy and R B Maury and W F Westmoreland Sr and R A Kinloch and Virgil O Hardon and De Saussure Ford and W T Briggs and A B Miles and J T Paine and W H Wathen and A H Ferguson and Maurice H Richardson and a host of others all of whom contributed their quota to the up-building of the Southern Surgical and Gynecological Association and without whose support it could not have survived These celebrities, having ceased from their labors rest with us under the shade of the trees whose leaves are for the healing of the nations

Friends, I have read the histories and looked upon the portraits and statuary of our nation's founders I have stood with uncovered head in the presence of the ashes of Britain's mighty dead I have gazed in awe at the sarcophagus of France's hero Emperor whose mighty step made the world to tremble I have walked through the gorgeous palaces of the Hapsburgs I have sat beside the soft blue waters of the Lucerne where William Tell is said to have rested I have studied in Edinburg's famous Royal Infirmary founded and granted by a scion of

my own ancestry yet I declare to you that in neither instance was I more impressed more overwhelmed with the sanctity of the presence by which I stood or more visualized by the greatness of their achievements than I am tonight as I humbly stand in your presence contemplating the lives of our illustrious predecessors the fruits of whose labors we are privileged to enjoy

We are to be congratulated that the grim reaper has robbed us of only a single Fellow during the current year For him and his loved ones we mingle our tears In this connection allow me to add that it is the source of the greatest gratification to see the vacancies which unfortunately must occur in our ranks rapidly filled by men of supreme ability and renown the very choice of the land Indeed we could not afford to admit any one except he be properly prepared thoroughly grounded in ethics loyal to an organized profession possessed of an unsullied character and give promise of untiring zeal

A careful study of the Constitution and By laws shows that this Association was not only founded upon sound principles but that its provisions have been amplified from time to time to meet changing conditions, adapting itself always to that which was most expedient For instance at first the membership was limited to one hundred now it is two hundred Formerly no Honorary Fellows were permitted now the Constitution provides for twenty five

Being a Southern institution only southern men were embraced within its membership at first Even on this limited basis the horizon of its possibilities widened so rapidly that early in the history of the Association it was determined to invite eminent men from north of the Mason and Dixon line to become members In my humble judgment this is one of the very wisest things the Association has ever done I cannot overstate the advantages which have grown out of this innovation While the Association will ever remain Southern in name and habitat it has long since become national in its membership and world wide in its sphere of influence Science men of science have

If the appendix looks pathologic or if the history shows attacks of pain in the right iliac fossa probably appendiceal in origin the appendix is removed so that the patient may be spared another operation. Some operators go so far as to remove every appendix when the abdomen is opened for other purposes on the ground that the additional operative procedure does not carry with it any increased mortality and that the patient has the right to expect that she will not be subjected at some future time to disease originating in this organ.

Shall the same kind of reasoning then be applied to the gall-bladder when the abdomen is opened for pelvic disease? In many respects the cases are parallel. Neither class of patients wants to be put to the inconvenience or expense of a second operation if the disease or what may result in disease in the extrapelvic portion of the abdomen can be cared for at the same operation. If gall stones have given symptoms either as indigestion or gastralgia or distinct attacks of gall-stone colic the patient will not recover her health even after the most skillful pelvic operation if the gall bladder be not attended to for existing disease or calculi. She has the right therefore to demand of the surgeon that so far as possible all of her pelvic and intra abdominal derangements be cured at one and the same operation. To the surgeon is left the question of what constitutes disease of the gall bladder or dangerous conditions so far as the pelvis be concerned and under what conditions he will be justified in exploring the gall bladder region through the lower abdominal incision. Also after exploration he will have to decide whether further operative procedures be necessary and finally the nature of the operation to be performed in each individual case.

In the present paper it is proposed to discuss some of these questions in the light of the findings of the palpation of the gall bladder in 1066 cases of abdominal section where the abdomen was opened low down for symptoms other than those of the gall bladder. It must be kept distinctly in mind that the discussion is limited to those cases where the principal disease is not in the gall

bladder but in the pelvis and gall-stones and other disease of the gall bladder and the biliary passages are present as incidents to the pelvic disease this decision being arrived at through routine palpation of the gall bladder region by way of the lower abdominal incision.

First of all I believe it should be stated emphatically once and for all that the day of the small abdominal incision has long since passed. The small inch or two-inch abdominal incision shows that the operator does not fully realize what modern efficient surgery demands of him. An ovarian cyst removed through an inch and a half abdominal incision means that the operator is entirely ignorant of many intra abdominal conditions which if they exist may mean the future discomfort or even death of his patient. Small transverse suprapubic incisions should also be dispensed with and the abdominal incision either transverse or preferably longitudinal should be large enough to admit the operator's hand thus permitting a thorough exploration of the abdominal cavity.

Just as in inspection of the appendix exploration of the gall bladder region is contra indicated in the presence of pus or other pelvic conditions whereby infection can be carried upward by the operator's hand. When dealing with inflammatory pelvic lesions exploration prior to the breaking down of the adhesions limiting the infectious process to the pelvis is a questionable procedure since if disease of the gall bladder be discovered an additional abdominal incision is of doubtful propriety in the presence of pelvic infection even if the incision over the gall bladder be made independently of the lower abdominal incision.

Again gall bladder work is contra indicated if the patient's condition at the close of the pelvic operation is such as to preclude additional surgical manipulation. Only poor surgical judgment would lead to the prolongation of the operation beyond certain well defined limits. Far better would it be for the patient to run the risk of a subsequent operation upon the gall bladder than to prolong the operation to the point where the patient might die from shock.

sities of a free and independent people is a guarantee that shall ever shall ever safeguard our national life and preserve inviolate the rights of the individual!

Recently I had the pleasure of examining an African tree-drum. It is a wonderful instrument hewn from the trunk of a tree without membrane or other addition. The slightest tap of my finger set in motion sweet toned vibrations. Under suitable conditions the tree-drum can be heard for ten miles. It is used to communicate from village to village antedating by untold centuries the Marconi wireless. Dr W R Lambeth told me that while traveling through the heart of the Congo with a caravan of sixty men his provisions gave out. He applied to one of the native villages for supplies. By means of a relay of tree drums they sent a message for a distance of thirty five miles securing the desired necessities. On another occasion Dr Lambeth telephoned a hundred and thirty miles after the same manner.

As I listened to the marvelous sounds of the tree drum and realized what a part it plays in the lives of the natives of the dark continent I exclaimed. Oh tree drum tell me of your people their origin their traditions their religions their customs the wrongs that have been heaped upon them the subjugations they have had to endure! Oh tree drum whisper to me a note of prophecy. What will civilization and the missionary and the medical man and science do for your people?

Will they lift them from the slough of ignorance and superstition and disease and in and bondage and set Africa as a jewel among the continents of the world? And with the ear of faith pressed close to its resonant bosom I heard a note of triumphant optimism come echoing back to me!

I need not apply these two homely illustrations connecting the past with the future the one taken from our national compass and the other from the jungles of Africa. They suggest their own application.

Friends what I have said is simply a review of that which you already knew better than I something of the famous surgeons of our southland the origin of our Association the personnel of a few of its Founders the broad and enduring basis upon which the organization was builded its purpose and scope as indicated by its Constitution and Transactions the high order of work being done the celebrated men composing its ranks in the past as well as the present the esteem in which our Fellows are held at home and abroad the continually increasing number of worthy men who are knocking at our door the delightful democracy that pervades our deliberations — and leave it with you Sirs, to judge whether or not we are justified in saying. The wisdom of the past is a prophecy of the future.

[Following the address Dr Long showed twenty five lantern slides of famous Southern surgeons and Fellows of the Association.]

GALL-STONES DURING THE COURSE OF 1066 ABDOMINAL SECTIONS FOR PELVIC DISEASE

B REUBEN PETERSON M.D. A.M. A. M. M.C.
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AFTER some years of discussion it now seems to be the consensus of opinion that the appendix should be inspected when the abdomen is opened by the lower abdominal incision unless the nature of the pelvic disease would endanger the patient were the uncontaminated peritoneum investigated. Although the

operator has every reason for believing that the content of a pyosalpinx are sterile he would not feel justified in inspecting the appendix for fear of infecting another part of the abdomen. This rule would be disregarded if the appendix were situated below the brim of the pelvis below the gauze packing protecting the upper abdominal peritoneum.

Read at the meeting of the Southern Surgical and Gynecological Association, Asheville, North Carolina, December 6,

stones at pelvic operations. In many more instances have I either regretted not removing the stones when such a procedure was perfectly possible or was forced to regret that the conditions at the time of operation were such as to contra indicate their removal.

In an article read before the American Gynecological Society in 1910 entitled

Gall-stones during Pregnancy and the Puerperium I referred to 542 women in the University of Michigan gynecologic clinic and in my private clinic whose gall bladders had been palpated during the course of pelvic operations. Of these 542 patients 64 or 11.8 per cent had gall stones. Since that time the number of patients thus inspected has reached 1,066 whose gall bladder findings I desire to submit for your consideration. The two clinics from which these cases have been taken are strictly gynecologic as far as the University Hospital is concerned and almost the same statement can be made of the private hospital clinic. In the public hospital every patient admitted is examined by the resident physician and assigned to the different services in accordance with the patient's major complaint. Hence in every case where gall stones were found at the gynecologic operation they were either unsuspected or their symptoms were of minor importance compared with the pelvic disease.

Among these 1,066 patients gall stones were found 135 times or in 12.66 per cent of the cases. It is interesting to note that the percentage of gall stone cases at the University clinic was 11.97 while at the private clinic the percentage was 14.84. The explanation of this difference in the frequency of gall stones in the two services lies in the possibility of some gall stones being overlooked in the public clinic where the operations are performed by the head of the department and his assistants during the third and fourth years of their services. I mention this since I am certain that stones can be easily overlooked in tense gall bladders unless great care be exercised at the time of the examinations or if the fingers have not been trained to such examinations.

Kelly found gall stones in 14.5 per cent of 46 women whose gall bladders were explored

through a low abdominal incision. In each instance where the gall stones were found the woman had been operated upon for either myoma or ovarian cyst. Kelly estimates gall-stones to be present in about 8 per cent of all his cases. Of 1,244 women operated upon at the Mayo clinic for uterine myomata 92 or 7.1 per cent had gall stones.

It has long been recognized that gall stones are more common in women than in men. Schroeder states that in Germany they are found in 20 per cent of female and 4.4 per cent of male necropsies. In 228 necropsies on women Brockbank found gall stones in 7.9 per cent while in autopsies on 542 males gall stones were present in only 2.9 per cent of the cases. In 19,974 autopsies of both sexes reported from Erlangen and Munich there were 1,852 cases of gall stones or 7.8 per cent. Mosher in 1,655 autopsies in both sexes at the Johns Hopkins Hospital found gall stones in 6.94 per cent of the cases. In 1,037 male necropsies they were present in 5.4 per cent of the cases while in 619 autopsies on females gall-stones were present in 9.37 per cent of the cases.

The high percentage of gall stones in the present series (12.66) may be due to one or more of three factors: the relative high average age of the patients examined since it is fairly well established that the older the person the greater the liability to gall stones; the high percentage of women in the series who have borne children or finally to the large proportion of uterine and ovarian neoplasms present in the women examined for gall stones. In Table I the cases have been arranged according to ages.

TABLE I
1066 patient examined for gall stones arranged according to age

Ages	Number of Cases	Number of Cases with Gall-stones	Percentage of Cases with Gall-stones
6 to 13	3	0	0.00
13 to 40	76	9	6.88
3 to 40	378	44	11.6
4 to 50	80	4	5.0
5 to 60	79	8	10.13
6 to 70	4	7	17.5
Ages unknown	6	4	66.7
	1066	115	10.78

Coincident gall bladder operations are also contra indicated where the pelvic operations are performed for malignant disease unless the operation upon the biliary passages or gall bladder be urgently demanded for the relief of great suffering. For instance it would be inadvisable to remove gall-stones at the same time the uterus is being removed by the abdominal route for cancer of the cervix. Aside from the great shock of radical operations for the removal of the cancerous uterus the ultimate results of such operations are so doubtful under the best conditions that the gall bladder should not be interfered with unless the seat of acute symptoms. And the presence of such symptoms makes the gall bladder or the biliary passages the primary disease and places such cases in a different category from those discussed in this paper.

Of primary importance is the frequency with which the gall bladder is affected coincident with pelvic disease and what shall be considered a diseased condition of the gall bladder. I approach the consideration of what shall constitute disease of the gall bladder with considerable hesitation since I am fully aware that from the nature of my work I am not as qualified to answer the question as dogmatically as are those who have to deal with many cases of primary gall bladder disease. I can judge the matter only from my own limited experience and from what I can glean from a perusal of the experience of others. But the gynecologist must face the situation and deal with it upon its merits or else dodge the question altogether. He must care for the pelvic condition and either not cure his patient or possibly subject her to subsequent suffering unless relieved by a second abdominal operation. More and more are we coming to believe that gall stones while not producing typical attacks of gall stone colic may give rise to many symptoms incorrectly attributed to indigestion. Those symptoms may not be very pronounced although a source of considerable inconvenience to the patient. Even a careful history will sometimes fail to more than arouse suspicion of the presence of gall-stones. Shall the gynecologist remove the gall stones at the time of the pelvic

operation or in other words does the mere presence of gall-stones warrant their removal when they are discovered during the course of another operative procedure?

I am more and more coming to the conclusion that other things being equal gall stones are a certain menace to the patient and would better be removed as an incident to pelvic operations provided this can be done with slight additional risk to the patient. Certainly if we follow the precepts of those doing the most gall bladder work we would advocate removal for they tell us that early uncomplicated gall bladder surgery should be attended by not more than a one per cent mortality and that the high mortality follows neglected cases. Who can say how or when a gall stone or a collection of such stones in the gall bladder will give rise to serious symptoms in a given patient? Certainly this cannot be predicted from the number or size of the stones. A small stone may be productive of very serious consequences while a large stone may apparently give rise to no symptoms and be of very little consequence. I recently removed two hundred fair sized gall stones from a patient at the same operation in which a hysterectomy was performed for an uterine fibroma. The closest questioning prior and subsequent to the operation failed to reveal any symptoms referable to the gall bladder.

Certainly it is true that we remove an appendix which appears diseased or is in a condition which may give rise to subsequent disease. Why then should we hesitate to remove gall-stones at the time of the pelvic operation if they represent an abnormal condition of the gall bladder and may prove a source of future annoyance and even menace to the patient? In my opinion we should not hesitate so to act provided we are justified in thinking that the additional surgical procedure can be performed with slight additional risk to the patient and that the gall bladder operation can be so performed as not appreciably to prolong the convalescence or leave the patient with symptoms not present before or worse than those from which she suffered prior to the operation. In only two instances have I regretted removal of gall

subsequently three from causes unconnected with the biliary tract and one six years after the pelvic operation from what was apparently hepatic cancer preceded by attacks of biliary colic

Of the 51 surviving patients from whom replies were received 32 or 62.7 per cent had no symptoms referable to the gall bladder although one or more gall-stones were present in each instance when they were discharged from the hospital. On the other hand 19 patients or 37.2 per cent wrote that they had had symptoms referable to the gall bladder 10 had had distinct gall stone attacks 6 had suffered from pain in the region of the gall bladder 2 had been operated upon for gall stones while one had been jaundiced

Had it been possible to perform cholecystostomy at the time of these pelvic operations over 90 instead of 62 per cent of these 51 patients would have been spared symptoms referable to the gall bladder. But in many of the cases additional operative procedures were clearly contra indicated and if they had been carried out would have greatly increased the primary mortality. Still in some of the cases the gall stones could have been removed had we been possessed then of the evidence now at hand that gall stones left at the time of pelvic operations will give rise to distinct subsequent gall bladder symptoms in 30 per cent of the cases. In another series of cases I would remove gall stones in every instance unless such a procedure be distinctly contra indicated

CONCLUSIONS

1 Except when contra indicated by the condition of the patient or the possibility of contaminating clean peritoneum the gall

bladder should always be palpated when the abdomen is opened for pelvic disease

2 Hence the small abdominal incision should give way to one large enough to permit of thorough exploration of the abdominal cavity

3 Gall stones will be found incidental to pelvic disease in 10 to 15 per cent of the cases

4 Their frequency will depend upon the ages of the patients more than upon the variety of the pelvic disease

5 As with gall-stones in general in women with or without pelvic disease the older the patient the more liable is she to have gall stones

6 Gall stones are much more common in women who have had children in the present series of cases 84.4 per cent of the 135 women with gall stones incidental to pelvic disease had borne children

7 When gall stones are removed at the time of pelvic operations from 85 to 90 per cent of the patients will have no subsequent symptoms referable to the gall bladder provided the proper technique be employed

8 When gall stones are not removed either because their mere presence is not thought to warrant their removal or because the condition of the patient forbids further operative procedure 30 per cent of the patients will suffer subsequently from gall stone attacks or other symptoms referable to the gall bladder

9 Therefore since gall stones are always liable to produce symptoms and at times are a distinct menace to the patient they should be removed when the abdomen is opened for pelvic disease if this can be done without much additional risk to the patient.

The 135 patients with gall-stones may be divided into two classes (a) those from whom the gall stones were removed (57) and (b) those where the gall stones were palpated but for one reason or another were not removed (78). Forty five or 81.8 per cent of the first class and 55 or 77.4 per cent of the second class were traced and their replies analyzed as follows

(a) Patients where gall stones were removed incidental to pelvic disease

Among these patients there were two primary deaths and 45 of the remaining 55 patients were traced. Of these 45 patients 29 or 64.4 per cent wrote that they had had no symptoms referable to the gall bladder since their operations that is they had had no gall stone colic no jaundice no pain in the gall bladder region nor symptoms of indigestion which could be ascribed to biliary calculi.

On the other hand 16 patients or 35.5 per cent of the cases reported symptoms having to do with the gall bladder region. However most of those with symptoms 11 out of the 16 patients had had no gall-stone colic nor other symptoms which would lead one to suspect that they had had a recurrence of the gall stones. Their symptoms were dragging pains in the right side in the neighborhood of the incision or soreness in the same region. As before stated these symptoms are attributable to the method of operation employed the dragging upward of the gall bladder and the fastening of it to the parietal peritoneum. The occurrence of such symptoms in a certain proportion of cases where the gall bladder is drained by this method has been noted by other observers and has led to drainage in the natural position of the gall bladder and non attachment to the parietal peritoneum. In further series of case this latter method will be employed with the expectation that the symptoms described above will be largely done away with.

Five patients had distinct gall stone attacks following removal of the calculi and drainage of the gall bladder. One patient had the gall bladder removed nine years after the cholecystostomy no stones being found. Another patient was operated upon ten years

after and fifteen stones were removed. Still another patient according to the testimony of her physician suffered from repeated attacks of gall-stone colic which did not cease until she had passed a number of stones per rectum. Two other patients had what they thought were attacks of gall stone colic just after returning home from the hospital but had had no recurrence for a number of years at the time of their reports.

Summarizing these findings, it is fair to state that 40 out of the 45 patients or 88.8 per cent were free from gall stone colic following the operations while 11.1 per cent had a recurrence of the gall stone colic. Whether all the stones were not removed at the time of operation or whether calculi reformed after their removal it is difficult to say. Occasionally gall stones do re form but from the testimony of those with the most experience it is exceedingly rare.

It is to be regretted that time has not permitted a careful perusal of the literature in reference to the presence of symptoms prior to the pelvic operations, but such a research is so time-consuming that it has been left for a subsequent paper. It can only be stated that while in a few cases gall stones were suspected prior to the pelvic operations in no instance were the symptoms such as to overshadow the importance of the pelvic condition. However it is only fair to say that more careful gall bladder histories may increase greatly the number of suspected cases.

(b) Patients where gall stones were found but not removed at the time of the pelvic operations

As expected the primary mortality was high in this class of cases for it included many patients with complicated tumors and patients operated upon radically for cancer of the uterus. There were 7 primary deaths from causes it is unnecessary to detail since they have no especial bearing upon the main purposes of this paper. They are only of importance as showing the severity of operations and why it was deemed inadvisable to remove the gall-stones at the same operation.

Of the 71 remaining patients 55 or 77.4 per cent were traced. Four patients died

to but less powerful than that obtainable with placental extract Table II illustrates results obtained in a series of such cases

TABLE II

SUBCUTANEOUS INJECTION OF PREGNANT GUINEA PIGS WITH DEFIBRINATED BLOOD FROM PREGNANT AND PUERPERAL WOMEN

N	Dosage	Result
3	ccm pregnant	Ova hatched
4	ccm puerperal	Killed in four days. Began ing. absorption of one fetus (?) Two pups normal
5	10 ccm puerperal	Progressed to term
6	5 ccm pregna	Mature fetus found dead (Stillbirth?)
7	5 ccm puerperal	Littered three pigs three weeks late
8	5 ccm pregnant	Aborted yemat re fetuses after three days
9	5 ccm pregnant	Aborted three macerated fetuses after 14 weeks. Death five days later Autopsy md cause death from absorption toxemia
10	ccm pregna	Littered one pig two week later
	1/2 ccm pregna	Littered two pigs 1/2 week later
	ccm pregnant	Progressed to term

To eliminate sources of error from injection of fluid alone two guinea pigs were given respectively 10 ccm and 15 ccm of normal salt solution. Pregnancy advanced undisturbed in both animals.

In other control experiments defibrinated blood from normal non pregnant women was injected. These experiments gave uniformly negative result as shown in Table III.

TABLE III

SUBCUTANEOUS INJECTION OF PREGNANT GUINEA PIGS WITH DEFIBRINATED BLOOD FROM NORMAL NON PREGNANT WOMEN

Number	Dosage	Result
21	1/2 ccm	Two young born
	ccm	Healthy young born
5	ccm	One young born
6	ccm	Two young born
	5 ccm	Two young born
16	10 ccm	One you born

It was next desired to note how pregnant guinea pigs were affected by injection of guinea pig placental extract and by blood from pregnant and puerperal pigs. The details of these experiments are recorded in Tables IV and V.

TABLE IV

SUBCUTANEOUS INJECTION OF PREGNANT GUINEA PIGS WITH EXTRACT OF GUINEA PIG PLACENTA IN NORMAL SALT SOLUTION

Number	Dosage	Result
20	ccm	Littered two pigs
30	3 ccm	Died three weeks late. In right horn of uterus three necrotic areas each 1 cm in diameter evidently where fetuses have been absorbed. I left horn necrotic liquid placental site with separated necrotic placenta. Almost mature macerated fetus. No bacteria or adhesions. Death from absorption of toxemia (?)
3	3 ccm	Aborted four mature fetuses one week later
5	5 ccm	Littered one pig
23	7 ccm	Development seemed retarded. Later progressed and littered 4 pigs three weeks later in section
3	ccm	Littered two pigs
35	ccm	Littered two pigs

TABLE V

SUBCUTANEOUS INJECTION OF PREGNANT GUINEA PIGS WITH BLOOD FROM PUERPERAL AND PREGNANT GUINEA PIGS

Number	Dosage	Result
36	ccm puerperal	Littered one pig
37	10 ccm pregna	Littered no try small pigs. One died 100 days
38	5 ccm puerperal	Littered normally
	ccm pregna	Littered one pig

SUMMARY

Sixteen pregnant rabbits and guinea pigs were given extract of human placenta in normal salt solution. In four instances pregnancy progressed undisturbed evidently because the amount injected was very small. Three advanced cases littered within 48 hours. In nine cases in which pregnancy was less advanced absorption or abortion of the embryos occurred in every instance. The absence of corpora lutea in animals which came to autopsy was a noteworthy finding as was also the presence of large corpus luteum cysts in the one guinea pig subjected to two injections of placental extract.

Ten pregnant guinea pigs were injected with defibrinated blood from pregnant and puerperal women. Five progressed to term. In two cases the results were doubtful in three there occurred absorption or abortion of the embryos.

EXPERIMENTS IN THE PRODUCTION OF ABORTION AND LABOR BY USE OF PLACENTAL EXTRACTS¹

By ARTHUR H. CURTIS M.D. CHICAGO

MUCH thought and energy have been expended in efforts to discover how therapeutic abortion or labor at term may be produced without operative interference. Thus far there has been obtained but little knowledge of the stimuli which cause emptying of the pregnant uterus and attempts to find harmless oxytocic substances of essential clinical worth have never met with success.²

In the course of efforts to determine what may safely and efficiently be given to patients who fail to go into labor at term it was decided to employ subcutaneous injections of whole blood derived from healthy puerperal patients. This was used in three cases on the service of Dr. Charles E. Paddock at St. Luke's Hospital. In one case labor pains occurred but ceased in a few hours; a second patient failed to respond and a third had severe pain. Toxic effects were not observed but it was decided to discontinue the work until various experiments upon animals had been performed.

As shown by Veit and others placental material is present in the circulation. Stimulated by the suggestion of positive results in the cases just mentioned and with the idea that circulating placental material might be responsible for the results noted it seemed desirable to study the effects of placental extracts upon pregnant animals.

Human placentas were obtained under aseptic precautions finely divided washed free from blood and extracted for 24 to 96 hours with normal salt solution. Only a few experiments were conducted at any one time and a fresh placenta was used in each set of cases. Pregnant rabbits and guinea pigs served as experimental animals. Injections were made subcutaneously care being taken not to exert undue pressure in any locality. For details of experiments see Table I.

TABLE I

SUBCUTANEOUS INJECTION OF PREGNANT RABBITS AND GUINEA PIGS WITH EXTRACT OF HUMAN PLACENTA IN NORMAL SALT SOLUTION

Number	Dosage	Result
Rabbit	40 ccn.	Abortion of one two-thirds developed gestated fetus on third day. Killed. Five fetuses one in various stages of absorption. Corpus luteum seen. No signs of infection.
Rabbit	5 ccn.	Abortion of five three-quarters grown slightly macerated fetuses on fourth day. Killed. Corpus luteum seen. No signs of infection.
Rabbit	20 ccn. dose repeated five days later	Rabbit well. Killed four days after second injection. Seven corpus luteum cysts left away from in right ovary. These are the largest corpus luteum cysts yet seen in rabbit. Uterus contains four young fetuses in each horn. If fully absorbed. No signs of infection.
Rabbit	20 ccn.	Killed two days later. Uterus boggy. Contains half dozen milky accumulations suggestive of absorption of ova.
Guinea pig	20 ccn.	Aborted three immature fetuses. Died on third day. Uterus contains one fetus and one with separation of placenta. In other with placenta still attached. No signs of infection.
Guinea pig	ccn.	Killed on 5th day because not well. Fetuses mostly absorbed. Parts of only two seen. No signs of infection.
Guinea pig	ccn.	Aborted one two-thirds developed fetus on third day. Autopsy. One fetus with detached placenta in right horn or uterus. No signs of infection.
Guinea pig	ccn.	Aborted three nearly mature fetuses on third day. Discharged in good condition.
Guinea pig	3 ccn.	Aborted three two-thirds developed fetuses on second day. Discharged in good condition.
Guinea pig	ccn.	Littered one pig with 24 hours. One died same day other healthy. Mother discharged in good condition.
Guinea pig	ccn.	Littered two heavy pigs within 4 hours. Mother discharged in good condition.
Guinea pig	ccn.	Littered two pigs next (second?) day. One died day following other well. Mother discharged in good condition.
Guinea pig	3 ccn.	
Cat	15 ccn.	
Guinea pig	ccn.	Littered respectively one two and one no mal offspring after periods ranging from 1 to 34 days.
Guinea pig	16 ccn.	

Because placental material is present in the maternal circulation it would seem reasonable to expect from the use of blood of pregnant and puerperal women an effect similar

¹The work of Keville and Neal (J. I. Sect. D. 91 44 and 45) whose report was discovered after the completion of this paper is of interest in this connection.

THE END-RESULTS OF TREATMENT OF ONE HUNDRED CASES OF FRACTURE OF THE ELBOW, IMMOBILIZATION IN HYPER FLEXION COMBINED WITH EARLY PASSIVE MOVEMENTS AND MASSAGE¹

By HAROLD NEUHOF, M.D. AND HEINRICH FRANZ WOLF, M.D. N. Y. 1914
From the Department of Surgery and Physical Therapy of the Mount Sinai Hospital Dispensary

THE unusual opportunity has been given us of studying and treating a large number of elbow fractures referred from Mount Sinai Hospital and the eight surgical departments of its dispensary. A comparative study of the results of immobilization for different periods of time and by various methods was therefore possible from the material of a number of competent observers. Our purpose is not a detailed description of the mechanism and varieties of fractures encountered but an analysis of the results of treatment and a description of the method whereby the best results were obtained.

A brief reference to the literature is necessary for the comparison of our results with those of other writers. The meaning of result should be defined first. By a perfect result we mean one in which the full and normal range of motion; the sequel of the treatment of a fracture of the elbow. Anything short of this is termed an imperfect result. The latter may vary from a slight varus or valgus deformity and little limitation of motion to marked change in the carrying angle and great limitation of motion. It is true that a slight deformity or a slight restriction of motion is compatible with a useful elbow for the purposes of standardization however it is thought best simply to term all results imperfect that are not absolutely perfect.² Selecting large groups of cases in which the end results of treatment by various splints and plaster of Paris bandages were carefully observed the following is noted. Coenen reports perfect results in 25 per cent of his cases. Cotton in 18.5 per cent of his series. Desot, Vignard and Barlatier

28.2 per cent. Hilgenreiner 21.3 per cent. The average of perfect result in the 123 cases of these authors is 23.25 per cent. Various positions of fixation of the elbow were employed in their cases immobilization in acute flexion being practiced in very few of them. The method of fixation in very acute flexion (well termed hyperflexion by Ashhurst) generally ascribed to Jones of Liverpool has been employed in occasional instances for the past forty years. It remained for Ashhurst, however to study carefully the mechanism of the so-called Jones position for elbow fractures and to demonstrate its advantages in a large series of cases. He reported 56 patients in whom it was employed and the results were perfect in 81 per cent of the cases. The details of the method will be subsequently described and we hope to prove its advantages over other postures. Why did Ashhurst not obtain a proportion of perfect results even higher than he reports? We believe the reason lies in the relatively prolonged immobilization he practiced and the absence of passive movements and massage in his after treatment. Our paper is in part written to verify this assertion especially in view of the opinion of many observers that the early mobilization and massage of elbow fractures are harmful procedures.

The cases we have studied are a group of one hundred consecutive elbow fractures seen from 1911 to 1914. No selection of material has been made the one hundred cases in which the final result could be determined being taken in succession. They include simple and comminuted fractures supracondylar fractures and those of the humerus that enter the joint fractures of the upper end of the radius and ulna in short all the types of fracture at the elbow joint. Recent cases are not included.

¹The standard high one but we agree with Ashhurst in the designation of perfect result. The statistics that we have quoted are taken from his valuable monograph "An Anatomical and Surgical Study of Fractures of the Lower End of the Humerus."

Subcutaneous injection of normal salt solution in two control animals did not disturb the development of pregnancy

Six control pregnant guinea pigs were injected with defibrinated blood from normal non pregnant women In every instance pregnancy was undisturbed and was followed by litter of healthy pigs

Seven pregnant guinea pigs were given extract of guinea pig placenta in normal salt solution Pregnancy progressed (delayed?) to term with litter of normal offspring in five instances One case terminated in abortion and one in absorption of the embryos

The injection of four pregnant guinea pigs with blood from puerperal and pregnant guinea pigs was followed by litter of healthy pigs In one instance birth may have been premature

Further studies should include a determination of the physiological properties of the oxytocic substance or substances contained in placental extracts Through work along these lines lies hope of obtaining a product which may be efficiently used to terminate pregnancy in human subjects Although control experiments with blood from non pregnant women gave negative results it is

advisable to make additional controls with other tissue extracts observation of the influence of extracts from various glands with internal secretion should be of especial interest It would also seem desirable to inject animals with placental extract during the early stages of pregnancy for the purpose of noting changes in the corpus luteum more knowledge of the peculiar relationship between placenta and corpus luteum might thus be gained

CONCLUSIONS

1 Extract of human placenta in normal salt solution is oxytocic for pregnant guinea pigs and rabbits

2 Defibrinated blood from pregnant and from puerperal women (which contains some placental material) possesses similar properties in a lesser degree

3 Defibrinated blood from non pregnant women appears not to disturb pregnancy in guinea pigs The same is true of normal salt solution

4 Extract of guinea pig placenta in normal salt solution seems to be slightly oxytocic for pregnant guinea pigs No noteworthy influence was exerted by blood from pregnant and puerperal guinea pigs

A careful calculation showed that the difference was equally striking in all the varieties of fracture. Only the total results will therefore be given. Patients finally discharged with a *perfect* result were referred for mobilization and massage at periods averaging 12.8 days after fracture. Patients finally discharged with an *imperfect* result were referred for mobilization and massage at periods averaging 32.2 days after fracture.

It was thought important especially from an economic point of view to determine the length of treatment by mobilization and massage in relation to the interval after fracture that patients came for this treatment. In estimating this relationship the question of the final outcome was not considered and ultimately perfect and imperfect results are grouped together. It should be clearly understood however that fractures yielding perfect results generally required a much shorter period of massage and mobilization than those yielding imperfect results.

DECREASE OF TREATMENT BY MASSAGE AND MOBILIZATION

Duration 15.7 days	for fractures immobilized for one week
Duration 24.5 days	for fractures immobilized for two weeks
Duration 27.7 days	for fractures immobilized for three weeks
Duration 36.0 days	for fractures immobilized for four weeks
Duration 32.2 days	for fractures immobilized for five to seven weeks

In connection with this tabulation it should be stated that the patients in the various week groups were not discharged after 15.7 days, 24.5 days, etc. The figures simply indicate the periods of time during which treatment was found necessary or advantageous. After these periods the patients were permitted to use their elbows freely and they returned from time to time for control. The decrease in the duration of treatment in the five to eight weeks group is explained by the fact that the great majority of the fractures of this group yielded imperfect results and the patients were discharged when it was evident that imperfect results were the best to be obtained.

The rôle of hyperflexion in the results obtained will now be considered. Opponents

of treatment by early massage and mobilization maintain that reduction of elbow fractures combined with immobilization in hyperflexion yields sufficiently satisfactory results. This is evidently not the case for the best statistics; those of Ashhurst give perfect results in only 81 per cent of the cases. It should be indicated that immobilization for several weeks although strongly urged by Ashhurst is not absolutely carried out by him. He dresses the injured elbow every third or fourth day at the dressings; hyperflexion is cautiously diminished just enough to enable the surgeon to bathe the flexure of the elbow and to insert a new piece of lint. This is not of course any planned attempt at mobilization; indeed Ashhurst expressly states that early passive motion of the fractured elbow is equivalent to torture. Although not directly concerned with this paper it may not be out of place to say that before combining early mobilization and massage with hyperflexion one of us (H. N.) treated a series of elbow fractures (not in the statistics of this paper) by immobilization in hyperflexion for periods averaging three weeks. The results were more satisfactory than those previously obtained by fixation in other positions but by no means entirely satisfactory. Returning to the question of the relation of hyperflexion to the results recorded in our statistics we now wish to call attention to the fact that the majority (sixteen) of the cases referred for massage and mobilization in the first week after injury and a number (seven) referred in the second week were elbow fractures fixed in hyperflexion by one of us (H. N.). The results were perfect in all the twenty-three cases in which fixation in hyperflexion was combined with early mobilization and massage with one exception. The exception was a patient ten years old (Case 24) in whom the lower end of the humerus was very extensively shattered by the injury. This was evident in the physical examination and the X-ray picture. Despite several attempts under anesthesia the fragments could not be set in good position. The elbow was fixed in hyperflexion after each of these efforts and mobilization and massage were begun on the ninth day. The final result is an elbow

Fractures about the elbow are chiefly injuries of childhood but adults (nine in number) have not been excluded from our series. Fracture was most frequent in children in the tenth year. The incidence remaining about the same in the second, third and fourth years of life, rose in the fifth year and increased almost regularly in the succeeding years. After the tenth year elbow fracture was less common. Nothing is to be added concerning the question of age for this did not appear to be a factor influencing the result. It should be stated however that in the experience of one of us (H. F. W.) good results from elbow fractures in adults depend even more upon early mobilization and massage than do such results in children. The elbow fracture of an adult immobilized for a considerable period is almost bound to be followed by more or less limitation in motion whereas early movements and massage are just as certain to result in excellent function. The number of elbow fractures in adults in this series is too small to prove these statements.

For our purposes a very simple classification of elbow fractures has been employed:

1. Supracondylar (including diacondylar)
2. External condylar (including capitellum and epicondyle)
3. Internal condylar (including trochlea and epitrochlea)
4. Upper end of ulna
5. Upper end of radius

Although not accurate anatomically this classification is most useful here because we have not found any difference in results in the various sub-groups. The statistics we have quoted from Ashhurst and others concern fractures of the lower end of the humerus alone but it was thought desirable to include fractures of the upper end of the radius and ulna in our report.

That the elbow fractures were sent for massage and mobilization from eight different departments was stated in the beginning of this paper. The interval after fracture at which the patients were referred varied considerably with the different departments. Some sent all elbow fractures others only those cases that did not appear to be doing

well with the ordinary methods of treatment. These factors must be considered in the interpretation of the statistics. For on the one hand if the chance for a perfect result is increased by having all cases favorable and unfavorable come from one source it is certainly diminished by the comparatively unfavorable elbow fractures derived from another source. The final discharge with a perfect result was made in 53 per cent of our cases the remaining 47 per cent presented results more or less imperfect. The following is the list of the cases according to the classification already outlined:

	Perfect Result Cases	Imperfect Result Cases
Supracondylar fractures	3	20
Fractures of the external condyle	5	6
Fractures of the internal condyle	12	9
Fracture of the upper end of the ulna	6	5
Fracture of the upper end of the radius	4	—
Total	53	40

This tabulation demonstrates that the chances for cure do not depend to any great extent upon the type of fracture. The majority of those fractures grouped under external condyle and internal condyle entered the joint.

Turning to the question of the relation of perfect results to the period of immobilization of the elbow, our experience was very impressive to us. We found that the outlook for perfect results was by far most favorable when the fractures were immobilized for the briefest period possible and when massage and mobilization were instituted thereafter and this is demonstrated by the accompanying table:

	Perfect Result Cases	Imperfect Result Cases
Mobilization and massage begun in first week after injury	7	—
Mobilization and massage begun in second week after injury	9	—
Mobilization and massage begun in third week after injury	6	5
Mobilization and massage begun in fourth week after injury	—	5
Mobilization and massage begun in fifth week after injury	—	1
Total	53	40

The average number of days of immobilization for the group of perfect result was then compared with that of the imperfect results.

way of determining in advance what the result of any elbow fracture will be. Limitation of motion in a well flexed elbow is the least disadvantageous form of limitation. From this viewpoint hyperflexion is also the most desirable position.

The arguments advanced for hyperflexion for supracondylar fracture apply with almost equal force to most of the other fractures about the elbow. It would lead us too far afield to enter into further details suffice it to state that our statistics show that the results of fracture of the condyles and of the upper end of the radius are as good as those of supracondylar fractures when fixation in hyperflexion is combined with early massage and mobilization.

Before the elbow is placed in hyperflexion all displaced fragments should be reduced. This is possible in the great majority of the cases. In a small but very instructive group of the patients in our series accurate reduction was impossible. They were instances of very complicated comminuted fractures of the lower end of the humerus the outlook for any other than operative treatment appeared very bad in all these cases. Nevertheless the results of hyperflexion combined with early massage and mobilization were perfect in all but one case. The latter has already been presented in detail.

The effects of attempts at reduction (general anesthesia occasionally necessary) should be invariably controlled by radiograms taken immediately after in order to correct promptly any pronounced displacement that may remain. It may be out of place to state our firm conviction that the minimal amount of examination commensurate with the establishment of a diagnosis and the setting of a fracture is of the greatest advantage to the patient. We are most strongly opposed to the viewpoint of those who consider it essential to search for crepitus abnormal mobility etc. in order to make the examination complete. In not a few instances we have seen fractures impacted in good or fair positions that have done remarkably well by avoiding such a search. Indeed we ascribe a share of the results in the cases treated by hyperflexion to a minimal amount of trauma inflicted in the

examination and the fixation of the injured elbow.

The technique of hyperflexion has already been indicated to some extent. It would take us too far from our subject to discuss the methods of reducing displaced fragments. The fracture having been set by one of these methods the elbow is placed in hyperflexion. *Hyperflexion does not mean merely acute flexion it is the most acute flexion in which the elbow can be fixed without obliterating the radial pulse.* Varying with the amount of swelling at the elbow as well as with the muscular and adipose tissue of the arm the angle at which the joint can be flexed generally ranges between 20 and 35 degrees. It is very remarkable to observe the extreme flexion obtainable in most instances of recent fracture. The time for fixation in hyperflexion is not when the swelling at the elbow has receded but as soon after the fracture as the patient is seen. The best results are unquestionably attained in the most recent fractures.

The forearm is flexed upon the arm with the axes of both coinciding. In Ashhurst's opinion it is immaterial if the forearm is in pronation or in supination. The latter position is preferred by us we have made it an invariable rule to see that the thumb points directly outwards when the elbow is ready for the bandage. A piece of gauze is placed in the bend of the elbow. For immobilization we have employed Ashhurst's bandage with a few minor changes and have found it very satisfactory and most suitable for our purposes. An ordinary roller bandage is used. First bandaging in the hand (leaving the fingers exposed) several turns are taken around the wrist. The lower end of the ulna is protected by absorbent cotton. Drawn firmly the bandage is carried from the wrist around the upper arm as near the axilla as possible and is then brought around the wrist again. This circular turn around the forearm and arm is repeated the turns being carried nearer and nearer the elbow. They are held in place by alternating turns passed about the elbow. Ashhurst finishes the bandage around the neck in order to make a sling for the elbow but this does not appear advantageous to us.

considerably deformed with the full degree and power of flexion extension to 145° and a normal carrying angle.

It is then as incorrect to state that the position of the elbow is of no importance if mobilization and massage are begun early as to maintain that the position of hyperflexion is satisfactory without early mobilization and massage. The combination of fixation in hyperflexion with early massage and mobilization offers the ideal chance for a perfect result.

Before describing this combined treatment it should be stated that six of the series of one hundred elbow fractures were operated upon. We have studied them only from the viewpoint of result not that of indication or of technique. A perfect result was not obtained in any of the cases operated upon and subsequently sent for mobilization and massage. How different the results might have been if these patients were not operated upon cannot of course be determined however we have seen so many satisfactory results from careful non-operative treatment of elbow fractures (even when accompanied by marked displacement of fragments) that we are exceedingly conservative in our indications for operation.

THE RATIONALE AND THE TECHNIQUE OF HYPERFLEXION

From the viewpoint of leverage the position of hyperflexion for fracture of the elbow is more advantageous than that of flexion in any angle less than the most acute obtainable or in the position of extension. Although in the latter position the axes of the forearm and arm nearly coincide and leverage for rotation of the humerus is absent

the forearm acts as a powerful lever in adducting or abducting the humerus and if any fracture of the humerus

exists the nearer it is to the elbow the more easily will the position of the lower fragment be influenced by abduction or adduction of the forearm (Ashhurst). In other words if the fragments are not in absolute alignment and the forearm is not fixed in an entirely correct relation to the arm marked distortion of the lower fragment of a fracture of the humerus near the elbow can readily occur.

Furthermore most of the fractures of the lower end of the humerus are oblique supracondylar lesions. The obliquity is generally downwards and forwards from the extensor to the flexor surfaces. The lower fragment shows a tendency to backward and upward displacement not only from the contour of the fracture but also from muscular action. Extension of the elbow may aid and in no way prevent this tendency. Semiflexion of the elbow or flexion less acute than hyperflexion are better positions for correct fixation of the fragment but *any flexion short of hyperflexion does not abolish the lever action of the forearm*. When the latter exists the

lightest adduction or abduction of the forearm may cause marked rotation of the lower fragment of a fractured humerus and it may be an exceedingly difficult problem to control this distortion. In the position of hyperflexion the leverage of the forearm is completely abolished and the distorting influence of the muscles that span the elbow is largely eliminated. Hyperflexion has an additional advantage in respect to leverage. With the elbow in the acutely flexed posture the triceps acts as a natural splint of the lower end of the humerus. It is closely applied to the humerus, covers the extensor surfaces of the condyles and preads out beyond the joint in a broad and powerful aponeurosis. This action of the triceps in hyperflexion is one of the greatest advantages of the position in our opinion.

Hyperflexion is as correct for the maintenance of the carrying angle as it is for leverage. If the carrying angle is distorted as a result of fracture it is well known that the axis of the forearm crosses that of the arm when the elbow is flexed. The argument for immobilizing the elbow in extension to avoid gunstock deformity is invalidated when it is realized that the position of hyperflexion is sustained with the forearm in exact alignment with the arm. The axes of the two coincide in other words the carrying angle can be maintained without extending the elbow to determine if there is gunstock deformity.

Finally it should be added that most of the unfortunate results of fracture of the elbow consist in limitation of flexion. There is no

September 20 1912 In moderate flexion for eight days Mobilization and massage for five weeks discharged with slightly limited flexion Examination April 1914 Slight limitation in flexion extension complete Measurements Left flexion 35° extension 180° right flexion 38° extension 180°

CASE 26 Isaac Z age 10 Committued epiphyseal fracture of the left humerus, February 28 1912 Wet dressings for eight days Then mobilization and massage Continued for three months during which period there was very slow improvement Healing with pronounced deformity of joint Discharged with flexion 70° extension 150° Examination June 1913 Enormous deformity of lower end of humerus moderate valgus free motion and good power between 70 flexion and 155° extension

CASE 27 Samuel T age 10 Diaphyseal fracture of right humerus with moderate displacement November 10 1912 In extension for ten days Then mobilization and massage for two months Discharged with 60 flexion and 170 extension Examination in February 1913, showed a little additional improvement no outlook for a perfect result The first X ray pictures did not appear to show any fracture but pictures taken in January showed an old diaphyseal fracture with faulty union of the fragments

CASE 28 Jennie S age 19 months Supracondylar fracture of the left elbow with considerable displacement November 11 1912 Fixed in acute flexion for one week then at right angles for five days Mobilization and massage for three weeks discharged with approximately normal function Examination April 1914 Very marked varus normal flexion and extension Measurements of both elbows Flexion 35° extension 180°

CASE 29 Nicholas C age 26 months Diaphyseal fracture of the left humerus with slight displacement September 7 1912 In semiflexion for two weeks Mobilization and massage for four weeks at end of which time extension was complete flexion limited to 70 Examination April 1914 Marked limitation in flexion extension complete exceedingly pronounced varus deformity Measurements Right flexion 35° extension 180° left flexion 70 extension 180°

CASE 30 John O L age 3 Supracondylar fracture of the left humerus with marked rotation of the fragment August 1 1912 Fixed at right angles for two weeks then mobilization and massage During the latter flexion beyond 90° was never obtainable Examination April 1914 Good power slight varus deformity flexion markedly limited by callus on anterior aspect of lower end of humerus flexion complete Measurements Right flexion 30 extension 85° left flexion 90 extension 185°

CASE 31 Sydney K age 10 Incomplete supracondylar fracture of the left humerus August 27 1912 In semiflexion for two weeks mobilization and massage for six weeks Result was then considered so unsatisfactory that operation was advised Case not seen since

GROUP 2

CASE 32 Abraham M age 5 Supracondylar fracture of the right humerus very slight displacement October 24 1913 First fixed in extension then in flexion Mobilization and massage after two and one half weeks continued for three months Examination April 1914 Some prominence of callus on anterior aspect of humerus Slight varus Pronounced limitation in flexion Measurements Left flexion 35° extension 180° right flexion 85° extension 185°

CASE 33 William W age 6 Diaphyseal fracture of right humerus June 1 1911 Immobilized at right angles three weeks later mobilization and massage were begun After several weeks treatment flexion was normal extension to 170° limited by callus No outlook for further improvement and patient was therefore discharged

CASE 34 Moses V age 5 Supracondylar fracture of the right elbow with considerable displacement April 25 1912 In semiflexion for three weeks Then in the hospital where brisement force was practice in attempt to improve the limited motion This was subsequently repeated at another institution Mobilization and massage ineffectual Examination December 1913 Very marked limitation of motion (flexion 95° extension 165°) extensive deformity of lower end of humerus

CASE 35 Mary L age 6 Supracondylar fracture of right humerus July 20, 1912 In wet dressings for two weeks then plaster of Paris for two weeks Then mobilization and massage When last seen September 1912 motion was limited between flexion 70° and extension 170° and there was no outlook for a satisfactory result

CASE 36 Fanny S age 12 Supracondylar and external condylar fracture of left humerus December 19 1912 Immobilized in various positions chiefly extension for four weeks Very slow improvement under mobilization and massage of many weeks duration Final result was flexion 70° extension 170° muscle power fair

CASE 37 Sarah K age 5 Supracondylar fracture of right humerus with pronounced displacement February 4 1911 Fragment not successfully reduced Sent for mobilization and massage on March 11 At that time there was a bayonet deformity flexion limited to 70° extension to 130° and operative treatment was soon advised Subsequent fate unknown

CASE 38 Pietro S age 7 Left sided supracondylar fracture with considerable displacement September 4 1912 Imperfect reduction immobilized in semiflexion for four weeks Then mobilization and massage under which there was steady improvement up to flexion 50° extension 170° Examination December 1912 Flexion normal extension 170° the limitation being due to callus

CASE 39 Julia G age 4 Supracondylar fracture of the right humerus with moderate lateral displacement June 23 1913 Immobilized for five weeks first in extension later in flexion Musculo-

September 30 1912 In moderate flexion for eight days Mobilization and massage for five weeks discharged with slightly limited flexion Examination April 1914 Slight limitation in flexion extension complete Measurements Left flexion 35° extension 180° right flexion 38° extension 180°

CASE 26 Isaac Z age 10 Commuted epiphyseal fracture of the left humerus February 28 1912 Wet dressings for eight days Then mobilization and massage Continued for three months during which period there was very slow improvement Healing with pronounced deformity of joint Discharged with flexion 70° extension 150° Examination June 1913 Enormous deformity of lower end of humerus moderate valgus, free motion and good power between 70° flexion and 155° extension

CASE 27 Samuel T age 10 Diacondylar fracture of right humerus with moderate displacement November 10 1912 In extension for ten days Then mobilization and massage for two months Discharged with 60 flexion and 170 extension Examination in February 1913 showed a little additional improvement no outlook for a perfect result The first x ray pictures did not appear to show any fracture but pictures taken in January showed an old diacondylar fracture with faulty union of the fragments

CASE 28 Jennie S age 19 months Supracondylar fracture of the left elbow with considerable displacement November 12 1911 Fixed in acute flexion for one week then at right angles for five days Mobilization and massage for three weeks discharged with approximately normal function Examination April 914 Very marked varus normal flexion and extension Measurements of both elbows Flexion 35° extension 180°

CASE 29 Nicholas C age 26 months Diacondylar fracture of the left humerus with slight displacement September 17 1912 In semiflexion for two weeks Mobilization and massage for four weeks at end of which time extension was complete flexion limited to 70° Examination April 1914 Marked limitation in flexion extension complete exceedingly pronounced varus deformity Measurements Right flexion 35° extension 180° left flexion 70° extension 180°

CASE 30 John O L age 3 Supracondylar fracture of the left humerus with marked rotation of the fragment August 9 1912 Fixed at right angles for two weeks then mobilization and massage During the latter flexion beyond 90° was never obtained Examination April 914 Good power slight varus and firmity flexion markedly limited by callus on anterior aspect of lower end of humerus flexion complete Measurements Right flexion 30° extension 150° left flexion 35° extension 180°

CASE 31 Budney K age 10 Incomplete supracondylar fracture of the left humerus August 27 1912 In semiflexion for two weeks mobilization and massage for six weeks Result was then considered so unsatisfactory that operation was advised Case not seen since

GROUP 2

CASE 32 Abraham M age 5 Supracondylar fracture of the right humerus very slight displacement October 24 1913 First fixed in extension then in flexion Mobilization and massage after two and one half weeks continued for three months Examination April 1914 Some prominence of callus on anterior aspect of humerus Slight varus Pronounced limitation in flexion Measurements Left flexion 35° extension 180° right flexion 85° extension 185°

CASE 33 William W age 6 Diacondylar fracture of right humerus June 1 1911 Immobilized at right angles three weeks later mobilization and massage were begun After several weeks treatment flexion was normal extension to 170° limited by callus No outlook for further improvement and patient was therefore discharged

CASE 34 Moses V age 5 Supracondylar fracture of the right elbow with considerable displacement April 25 1912 In semiflexion for three weeks Then in the hospital where brisement force was practiced in attempt to improve the limited motion This was subsequently repeated at another institution Mobilization and massage ineffectual Examination December 1913 Very marked limitation of motion (flexion 95° extension 165°) extensive deformity of lower end of humerus

CASE 35 Mary L age 6 Supracondylar fracture of right humerus July 20, 1912 In wet dressings for two weeks then plaster of Paris for two weeks Then mobilization and massage When last seen September 1912 motion was limited between flexion 70° and extension 170° and there was no outlook for a satisfactory result

CASE 36 Lanny S age 11 Supracondylar and external condylar fracture of left humerus December 19 1912 Immobilized in various positions chiefly extension for four weeks Very slow improvement under mobilization and massage of many weeks duration Final result was flexion 70° extension 170° muscle power fair

CASE 37 Sarah K age 5 Supracondylar fracture of right humerus with pronounced displacement February 4 1911 Fragment not successfully reduced Sent for mobilization and massage on March 11 At that time there was a bayonet deformity flexion limited to 0° extension to 130° and operative treatment was soon advised Subsequent fat unknown

CASE 38 Pietro S age 7 Left sided supracondylar fracture with considerable displacement September 4 1912 Imperfect reduction immobilized in semiflexion for four weeks Then mobilization and massage for which there was steady improvement up to flexion 50° extension 170° Examination December 912 Flexion normal extension 10° the limitation being due to callus

CASE 39 Julia G age 4 Supracondylar fracture of the right humerus with moderate lateral displacement June 23 1913 Immobilized for six weeks first in extension later in flexion Musculo-

ment October 12 1913 Hyperflexion for one week. Then mobilization and massage. Discharged with nearly normal motion on November 25 1913. Examination April 1914 Normal flexion and extension (40° 180° both elbows) normal carrying angle.

GROUP B

CASE 12 John W. age 5 Supracondylar fracture of left humerus with comminuted displacement March 22 1911. Three attempts at reduction before an approximately correct reduction was obtained. Mobilization and massage begun April 12th continued for several weeks. Final examination May 1912 Normal flexion and extension normal carrying angle.

CASE 13 Doris W. age 10. Fractured supracondylar fracture of right elbow without displacement August 23 1913. Wet dressings for one week. Mobilization and massage for two weeks. Discharged with normal motion. Examination April 1914 Normal flexion and extension (both elbows flexion 35° extension 135°). Both elbows show pronounced valgus posture therefore of no pathological significance.

CASE 14 Mary H. age 9. Incomplete supracondylar fracture of the right humerus without displacement August 19 1913. Immobilized in partial extension for 3 days. Mobilization and massage for two weeks then discharged with normal motion.

CASE 15 Joseph W. age 11. Supracondylar fracture of left humerus with slight posterior displacement November 8 1911. Immobilized at right angle for 8 days. Mobilization and massage for several weeks at end of which time discharged with very little limitation in motion. Examination April 1914 Normal flexion and extension (flexion 40° extension 185° of both elbows) and normal carrying angle.

CASE 16 Max R. age 11. Supracondylar fracture of left elbow with very slight displacement March 14 1912. First immobilized in traction flexion for one week then extreme extension for one week. Mobilization and massage for three weeks motion then fairly normal. Finally normal when seen November 5 1912. Examination April 1914 Normal flexion and extension (flexion 40° extension 180° both elbows) normal carrying angle.

CASE 17 William L. age 5. Supracondylar fracture no displacement October 5 1910. In plaster for 10 days then mobilization and massage. Very short period of treatment. Discharged with normal motion. Examination November 1910 Normal motion good in distal. December 1910 and January 1913.

CASE 18 Sylvester McC. age 9. Proximal fracture of right humerus without displacement also metacarpal fracture of right hand. June 1911. Immobilized at right angle for two weeks. Mobilization and massage discharged with approximately normal motion after several weeks. Examination

April 1914 Normal flexion and extension (flexion 35° extension 180° of both elbows) and normal carrying angle.

GROUP C

CASE 19 Gertrude K. age 22 months. Supracondylar fracture of left humerus with very little displacement a very marked effusion August 2 1912. Wet dressings for two weeks then plaster for one week. Then mobilization and massage with rapid improvement. Examination October 1913. Full motion normal carrying angle.

CASE 20 Lazzaro S. age 10. Supracondylar fracture with very little displacement March 10 1913. Immobilized in semiflexion for three weeks. Then mobilization and massage for two weeks. Examination November 1913. Normal flexion and extension normal carrying angle.

CASE 21 Luther M. age 6. Impacted supracondylar fracture of left elbow with slight posterior displacement July 31 1912. Immobilized for three weeks then mobilization and massage. Discharged September 23 1912 with practically normal motion. Examination April 1914 Normal motion (flexion 40° extension 135° both elbows) normal carrying angle.

CASE 22 Henry R. age 4. Supracondylar fracture of left humerus with very slight anterior displacement June 8 1912. Immobilized at right angles for one and one half weeks. Then mobilization and massage for four weeks at end of which time flexion was complete extension 10 to 120°. Examination November 1913. Normal flexion and extension normal carrying angle.

CASE 23 Samuel S. age 4. Supracondylar fracture with moderate anterior displacement April 27 1912. In hospital in semiflexion for one week. Then in clinic for four weeks at end of which time mobilization and massage were begun and continued for two weeks. Discharged with slightly limited flexion. Examination January 9 1913. Normal motion in flexion normal carrying angle.

GROUP D

CASE 24 Timothy C. age 10. Reported in the body of the paper. Extensive comminution of the left humerus with anterior displacement of the distal half of the physis. October 6 1913. At replacement of the fragment an attempt was made to replace the fragment with the operation suggested but not accepted. Hyperflexion for 10 days. Mobilization and massage for two months. Discharged with limited motion. Examination April 1914. On side the firmity of the end of humerus. Normal flexion pronounced limitation in extension carrying angle normal at the range of motion. Good position. Maximal Right flexion 40° extension 180° left flexion 40° extension 45°.

GROUP F

CASE 25 Isabel W. age 10. Supracondylar fracture of the right humerus without displacement.

September 20 1912 In moderate flexion for eight days Mobilization and massage for five weeks discharged with slightly limited flexion Examination April 1914 Slight limitation in flexion extension complete Measurements Left flexion 35° extension 180° right flexion 38° extension 180°

CASE 26 Isaac Z age 10 Communicated epiphyseal fracture of the left humerus February 28 1912 Wet dressings for eight days Then mobilization and massage Continued for three months during which period there was very slow improvement Healing with pronounced deformity of joint Discharged with flexion 70° extension 150° Examination June 1913 Enormous deformity of lower end of humerus moderate valgus free motion and good power between 70° flexion and 155° extension

CASE 27 Samuel T age 10 Diacondylar fracture of right humerus with moderate displacement November 10 1912 In extension for ten days Then mobilization and massage for two months Discharged with 60° flexion and 170° extension Examination in February 1913 showed a little additional improvement no outlook for a perfect result The first X-ray pictures did not appear to show any fracture but pictures taken in January showed an old diacondylar fracture with faulty union of the fragments

CASE 28 Jennie S age 10 months Supracondylar fracture of the left elbow with considerable displacement November 2 1911 Fixed in acute flexion for one week then at right angles for five days Mobilization and massage for three weeks discharged with approximately normal function Examination April 1914 Very marked varus normal flexion and extension Measurements of both elbows Flexion 35° extension 180°

CASE 9 Nicholas C age 26 months Diacondylar fracture of the left humerus with slight displacement September 17 1912 In semiflexion for two weeks Mobilization and massage for four weeks at end of which time extension was complete flexion limited to 70° Examination April 1914 Marked limitation in flexion extension complete exceedingly pronounced varus deformity Measurements Right flexion 35° extension 80° left flexion 70° extension 180°

CASE 30 John O L age 3 Supracondylar fracture of the left humerus with marked rotation of the fragment August 1 1912 Fixed at right angles for two weeks then mobilization and massage During the latter flexion beyond 90° was not obtainable Examination April 1914 Good power slight varus deformity flexion markedly limited by callus on anterior aspect of lower end of humerus flexion complete Measurements Right flexion 30° extension 85° left flexion 90° extension 85°

CASE 31 Sidney H age 10 Incomplete supracondylar fracture of the left humerus August 27 1912 In semiflexion for two weeks mobilization and massage for six weeks Result was then considered so unsatisfactory that operation was advised Case not seen since

GROUP II

CASE 32 Abraham M age 5 Supracondylar fracture of the right humerus very slight displacement October 24 1913 First fixed in extension then in flexion Mobilization and massage after two and one half weeks continued for three months Examination April 1914 Some prominence of callus on anterior aspect of humerus Slight varus Pronounced limitation in flexion Measurements Left flexion 35° extension 180° right flexion 85° extension 185°

CASE 33 William W age 6 Diacondylar fracture of right humerus June 1 1912 Immobilized at right angles three weeks later mobilization and massage were begun After several weeks treatment flexion was normal extension to 170° limited by callus No outlook for further improvement and patient was therefore discharged

CASE 34 Moses V age 5 Supracondylar fracture of the right elbow with considerable displacement April 25 1912 In semiflexion for three weeks Then in the hospital where *brusment forced* was practiced in attempt to improve the limited motion This was subsequently repeated at another institution Mobilization and massage ineffectual Examination December 1913 Very marked limitation of motion (flexion 95° extension 165°) extensive deformity of lower end of humerus

CASE 35 Mary L age 6 Supracondylar fracture of right humerus July 20 1912 In wet dressings for two weeks then plaster of Paris for two weeks Then mobilization and massage When last seen September 1912 motion was limited between flexion 70° and extension 170° and there was no outlook for a satisfactory result

CASE 36 Fanny S age 14 Supracondylar and external condylar fracture of left humerus December 19 1912 Immobilized in various positions chiefly extension for four weeks Very slow improvement under mobilization and massage of many weeks duration Final result was flexion 70° extension 170° muscle power fair

CASE 37 Sarah K age 5 Supracondylar fracture of right humerus with pronounced displacement February 4 1911 Fragment not successfully reduced Sent for mobilization and massage on March 1 At that time there was a bayonet deformity flexion limited to 70° extension to 130° and operative treatment was soon advised Subsequent fate unknown

CASE 38 Pietro S age 7 Left sided supracondylar fracture with considerable displacement September 4 1911 Imperfect reduction immobilized in semiflexion for four weeks Then mobilization and massage under which there was steady improvement up to flexion 50° extension 170° Examination December 1912 Flexion normal extension 170° the limitation being due to callus

CASE 39 Julia G age 4 Supracondylar fracture of the right humerus with moderate lateral displacement June 23 1913 Immobilized for five weeks first in extension later in flexion Musculo-

piral nerve involvement. Mobilization and massage begun July 31 continued for four weeks. Discharged with some limitation in motion. Examination April 1914. No evidence of muscular spiral involvement. Very marked varus. Some limitation in flexion extension complete. Measurements: Left flexion 40° extension 120° right flexion 47° extension 120°.

CASE 40. Walter K. age 10. Supracondylar fracture of the right humerus with very slight displacement. October 7, 1913. Mobilization and massage begun after five weeks continued for four weeks. Discharged with approximately normal motion. Examination April 1914. Rather thick callus on anterior aspect of lower end of humerus. Slight valgus deformity. Flexion highly limited. Extension normal. Measurements: Left flexion 45° extension 120° right flexion 50° extension 120°.

CASE 41. Harry B. age 6. Supracondylar fracture of right humerus with slight anterolateral displacement. July 2, 1913. Immobilized for six weeks. Mobilization and massage for four weeks. Discharged with the normal range of motion and marked gunstock deformity. Not seen since.

CASE 42. Sarah I. age 16. Dislocation of the right elbow and lateral fracture. February 5, 1912. After reduction of dislocation immobilization in various position for six weeks. The setting mobilization and massage with very slight range of motion in joint. Slow improvement in many weeks of treatment. Examination April 1914. Very marked valgus deformity. Power in the very limited range of motion. Measurement: Left flexion 40° extension 185° right flexion 85° extension 125°.

CASE 43. Rose I. age 6. Condylar fracture of the left humerus with moderate displacement. January 15, 1913. In various position for ten months. Mobilization and massage for six weeks. Discharged with flexion 60° extension 145°. Examination April 1914. Slight valgus deformity. Limitation in flexion and extension. Measurements: Right flexion 35° extension 185° left flexion 45° extension 175°.

CASE 44. Hain B. age 9. Supracondylar fracture of right humerus with considerable displacement. June 10, 1913. After immobilization in the hospital for several days the elbow was manipulated under anesthesia upon three different occasions in the effort to obtain free motion. When referred for mobilization a massage five weeks after injury the range of motion in the joint was very small. Moderate improvement under treatment but end result very unsatisfactory motion being very limited measurements not made.

CASE 45. Jack I. age 14. Supracondylar fracture without displacement. April 10, 1913. Immobilized in plaster for one week. Then manipulated under anesthesia and immobilized for two weeks. Mobilization and massage with improvement after several weeks. Flexion 80° extension 60° extension 160° poor power.

GROUP C

CASE 46. William I. age 5. Supracondylar fracture of the left humerus with moderate displacement. July 3, 1913. Fixed at right angles for ten weeks. Mobilization and massage for two weeks with little improvement in the range of motion. Operation July 20, 1913 at which the fragment on the anterior aspect of the humerus interfering with flexion was removed. Thereafter immobilization in flexion. Mobilization and massage after two weeks. When last seen October 20, 1913 extension was almost normal. Flexion limited to 90°.

CASE 47. William I. age 9. Supracondylar fracture of the right humerus with marked displacement. August 15, 1913. Treated conservatively at first result unsatisfactory operated upon September 20, 1913. Fragment reduced and nailed. Massage and baling started in hospital soon after continued in the clinic. February 1914. Marked limitation in motion—flexion 85° extension 10°.

CASE 48. Morris D. age 9. Supracondylar fracture of the left humerus with marked displacement. July 1, 1913. Immobilized for four weeks at another institution. Thereafter very marked limitation in motion. Brought to force in the hospital September 11, 1913. Slight improvement in motion. Operation October 12, 1913. Reduction and nailing of fragment. Examination April 1914. Flexion 90° extension 130° fair power. Extension deformity of lower end of humerus.

CASE 49. Joseph N. age 7. Supracondylar fracture of left humerus with moderate displacement. August 13, 1913. In partial extension for ten days. No reduction. Sent to hospital for operation. Fragment of bone obstructing flexion removed. Mobilization and massage begun ten days later continued for six weeks. Examination April 1914. Fair power. Fair moderate valgus deformity. Limitation in extension pronounced. Flexion Measurements: Right flexion 40° extension 120° left flexion 65° extension 125°.

FRACTURES OF THE INFRACLAVICULAR CONDYLE

AND EPITROCHILAL

Cases

Total number of cases

Perfect result

Group A—Hyperflexion in early mobilization and massage for fracture of infraclavicular condyle.

4

For fracture of epitrochil

Group B—Immobilization in non hyperflexed position, early mobilization and massage for fracture of infraclavicular condyle.

4

Fracture of epitrochil

Group C—Immobilization in non hyperflexed position in late mobilization and massage

9

Imperfect result

Group D—Immobilization in non hyperflexed position early mobilization and massage for fracture of infraclavicular condyle.

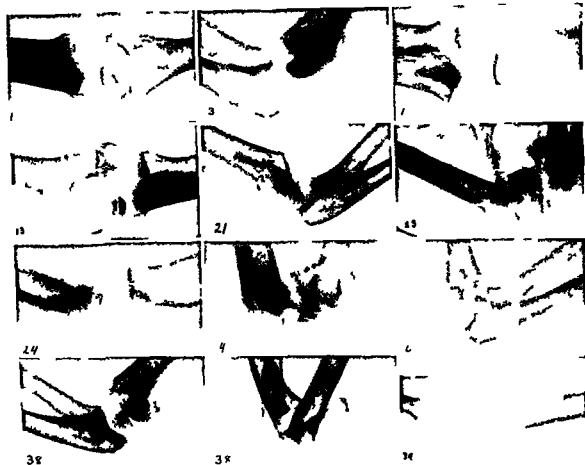
3

Fracture of epitrochil

Group E—Immobilization in non hyperflexed position late mobilization and massage for fracture of infraclavicular condyle.

3

Fracture of epitrochil



Figures show illustration re case numbers

Fig Case Group A 10 days after injury
Fig Case 3 Group A Seven weeks after complete
reduction of supracondylar fracture Perfect result
Fig 3 Case Group A Two days after injury
Fig 4 Case 3 Group B Two days after injury
Fig 5 Case Group C The day of injury
Fig 6 Case 3 Group C 5 days after injury
Complete reduction was not obtained
Fig 7 Case 4 Group D The day following the
injury Commenced fragments distinctly seen

Fig 8 Case 4 B Group D The last day of hyper
flexion
Fig 9 Case 3 Group I The day after injury
Medial rotation of the fragment
Fig 10 Case 38 Group I Two days after injury
Fig 11 Case 38 Group F 5 days after injury
Imperfect reduction
Fig 39 Group I 10 months after injury

GROUP A

CASE 50 Morris C age 11 Comminuted frac
ture of internal condyle and trochlea of left humerus
June 1913 Immobilized in hyperflexion two days
after injury Mobilization and massage begun on
June 10th Discharged on July 31st with normal
motion Examination April 1914 Normal flexion
and extension correct carrying angle bone contour
normal Measurements Flexion of 40° extension
of 180° both elbows

CASE 51 Alex E age 10 Fracture and down
ward displacement of right internal condyle

September 13 1913 Hyperflexion for six days
Mobilization and massage for three weeks Ap
proximately normal motion at time of discharge
Examination April 1914 Normal flexion and
extension Slight valgus of right elbow but the
same on nonfractured side and therefore of no
pathological significance Measurements Left
flexion 40° extension 185° right flexion 40° exten
sion 180°

CASE 52 Marcus C age 12 Fracture of the
internal condyle of the right humerus without dis
placement January 5 1914 Hyperflexion for nine

days Mobilization and massage discharged well on February 14th Examination April 1914 Normal flexion and extension normal carrying angle Measurements Left flexion 40° extension 185° right flexion 37° extension 180°

CASE 53 Harry P age 8 Fracture of the internal condyle of the left humerus with very little displacement June 5 1912 Treated elsewhere for several days Elbow found stiff and in poor position Good position obtained under anesthesia and joint fixed in hyperflexion (June 17th) Elbow swollen to a very marked degree Nevertheless mobilization and massage were begun on June 22d Steady improvement from the beginning Examination December 1913 Normal flexion and extension normal carrying angle fair power Circumference of the joint 2 cm greater than the normal size

CASE 54 Ida G age 8 Separation and posterior displacement of the left epitrochlea July 7 1913 Reduction fixation in hyperflexion for one week Mobilization and massage discharged on July 18 with slightly limited flexion Examination April 1914 Normal flexion and extension normal carrying angle Measurements Right flexion 40° extension 190° left flexion 38° extension 180°

GROUP B

CASE 55 Ma L age 9 Fracture and lateral displacement of a small portion of the internal condyle October 18 1912 Immobilized in partial extension for one week Mobilization and massage for three and one half weeks discharged well Examination April 19 14 Normal motion and carrying angle Measurements Flexion 40° extension 85° of both elbows

CASE 56 William M age 34 Fracture and moderate displacement of internal condyle left humerus November 4 1913 Fixed in flexion for one week mobilization and massage for three weeks Rapid improvement in motion Discharged with normal flexion and extension normal carrying angle

CASE 57 Charles L age 8 Comminuted fracture of internal condyle of the right humerus with slight displacement of the fragment December 2 1911 Mobilization and massage begun on December 11th Discharged with nearly normal motion December 17th Examination January 9 1912 Normal flexion and extension normal carrying angle

CASE 58 Fanny L age 9 Simple fracture of the right internal condyle August 6 1913 Immobilized in semiflexion for two weeks Mobilization and massage for four weeks discharged with normal function Examination April 19 14 Normal motion and carrying angle Measurements Left flexion 40° extension 180° right flexion 40° extension 185°

CASE 59 Max G age 1 Fracture displacement of right epitrochlea August 6 1913 Immobilized in partial extension for nine days Mobilization and massage for two weeks discharged in

good condition Examination April 1914 Slight prominence in region of internal condyle Normal motion and carrying angle Motions of both elbows range between 40 flexion and 185 extension

CASE 60 Bertha I age 24 Fracture of right epitrochlea with slight displacement November 18 1913 Immobilized in semiflexion for one week mobilization and massage for ten days Normal range of motion and carrying angle as determined one month later

GROUP C

CASE 61 August H age 16 Fracture of the right internal condyle with very slight displacement March 27 1912 Immobilized for three weeks then mobilization and massage Discharged with the normal carrying angle and range of motion May 1913

GROUP D

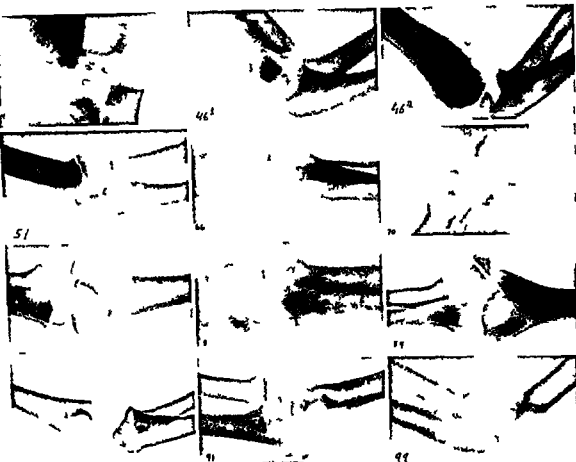
CASE 62 William B age 8 Detachment of the right internal condyle September 8 1913 Fragment imperfectly reduced Immobilized in semiflexion for one week Mobilization and massage for three months a short interim in which adhesions were broken up under anesthesia Discharged with somewhat restricted motion Examination April 19 14 Slight valgus slight limitation in flexion and extension Rather good power Measurements Left flexion 35° extension 180° right flexion 38° extension 175°

CASE 63 Ida W age 13 Fracture of internal condyle April 1913 Came for treatment one week later Immobilized in semiflexion for one week Mobilization and massage for four weeks Discharged with almost normal flexion extension to 175° very marked valgus

CASE 64 Harry S age 10 Infraction of right internal condyle November 10 1913 X-ray at first thought negative and case treated as sprain in accident room of hospital When transferred to the clinic ten days after injury flexion and extension were markedly limited and the internal condyle was very sensitive A second X-ray showed the lesion Referred for mobilization and massage under which improvement was steady Examination May 1914 Fullness over the anterior aspect of the internal condyle Pitches ball well Some limitation in flexion and extension carrying angle normal Measurements Left flexion 38° extension 180° right flexion 45° extension 175°

CASE 65 Isador C age 8 Separation of right epitrochlea January 3 1913 In partial extension for nine days then mobilization and massage disappeared from observation on February 10th Motion then ranged from 90 in flexion to 70 in extension Although incompletely followed the case is included here because it can be definitely stated that there was no outlook for a perfect result

CASE 66 Max S age 8 Fracture and marked displacement of the right epitrochlea November 8 1913 Bandaged for six weeks Large and painful



Figures show illustrations are case numbers

Fig 1 Case 44 Group I The day following injury
 Fig 2 Case 46-A Group G The day following injury
 Fig 3 Case 46-B Group G One month after operation
 Fig 4 Case 54 Group A The day following injury
 Fig 5 Case 66 Group D Eleven days after injury
 Fig 6 Case 7 Group I Eleven days after injury
 Fig 7 Case 7 Group A The day following injury

Fig 8 Case 87 Group D Ten days after injury
 Fig 9 Case 87 Group D Ten days after injury
 Fig 10 Case 87 Group D Ten days after injury
 Fig 11 Case 87 Group D Ten days after injury
 Fig 12 Case 87 Group D Ten days after injury
 Fig 13 Case 87 Group D Ten days after injury
 Fig 14 Case 87 Group D Ten days after injury
 Fig 15 Case 87 Group D Ten days after injury
 Fig 16 Case 87 Group D Ten days after injury
 Fig 17 Case 87 Group D Ten days after injury
 Fig 18 Case 87 Group D Ten days after injury
 Fig 19 Case 87 Group D Ten days after injury
 Fig 20 Case 87 Group D Ten days after injury
 Fig 21 Case 87 Group D Ten days after injury
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 Fig 94 Case 87 Group D Ten days after injury
 Fig 95 Case 87 Group D Ten days after injury
 Fig 96 Case 87 Group D Ten days after injury
 Fig 97 Case 87 Group D Ten days after injury
 Fig 98 Case 87 Group D Ten days after injury
 Fig 99 Case 87 Group D Ten days after injury
 Fig 100 Case 87 Group D Ten days after injury

effusion in the elbow joint Mobilization and massage for three weeks discharged with imperfect result Examination April 1914 Considerable limitation in flexion carrying angle normal Measurement Left flexion 40 extension 180 right flexion 75 extension 85

CASE 67 Louis B age 16 Simple fracture of left epitrochlea May 3 1913 In extension for six days then mobilization and massage very slow improvement treatment continued for three months Examination April 1914 Very slight valgus moderate limitation in flexion Measurements Right flexion 45 extension 80 left flexion 55° extends on 60°

GROUP E

CASE 68 John R age 10 Fracture of internal condyle and impacted fracture of the neck of the radius (left elbow) July 4 1912 In extension for three weeks Mobilization and massage very ineffectual, owing to joint adhesions (?) Brûlé's method used on August 27th Thereafter mobilization and massage were somewhat more effective When last seen October 1912 there was considerable limitation in flexion and extension

CASE 69 William G age 12 Fracture of the right internal condyle without displacement November 1 1913 Immobilized for three weeks then mobilization and massage Discharged December

ber 3d motion approximately normal Examination April 1914 slightly limited flexion extension normal carrying angle normal Does heavy work without discomfort Measurements Left flexion 50° extension 180° right flexion 55° extension 180°

CASE 70 Gussie A age 12 Fracture of the epitrochlea and trochlea of the left humerus August 30 1912 Immobilized in partial extension for three weeks mobilization and massage for 7 weeks discharged with imperfect result Examination April 1914 Slightly limited flexion moderately limited extension moderate valgus Measurements Right flexion 60° extension 180° left flexion 63° extension 140°

FRACTURE OF THE EXTERNAL CONDYLE

Tal number of cases	Cases
Perfect results	4
Group A — Hyperflexion early mobilization and massage	3
Group B — Immobilization in non hyperflexed position early mobilization and massage	3
Group C — Immobilization in non hyperflexed position, late mobilization and massage	6
Imperfect result	3
Group D — Immobilization in non hyperflexed position, early mobilization and massage	3
Group E — Immobilization in non hyperflexed position, late mobilization and massage	
Group F — Operated upon	

GROUP A

CASE 71 Thomas G age 7 Fracture of the external condyle of the left humerus internal displacement of fragment and capitellum September 20 1913 Hyperflexion for one week then mobilization and massage Discharged October 10th with normal motion Examination April 1914 Normal flexion and extension and carrying angle Measurement Right flexion 50° extension 185° left flexion 50° extension 18°

CASE 72 David Z age Fracture of right external condyle August 16 1913 Treated elsewhere (in extension) for one week Fragment found displaced downwards and inwards Reduction

Fig 5 Case Group A Perfect result Supracondylar fracture of left humerus

Fig 6 Case 5 Group 1 Perfect result Commuted supracondylar fracture of left humerus

Fig 7 Case 9 Group 1 Perfect result follow supracondylar fracture and fracture through the upper end of the ulna Right elbow

Fig 8 Case 3 Group B Perfect result Injured supracondylar fracture of right elbow

Fig 29 Case 24 Group D Mild limitation following commuted fracture of the humerus

Fig 30 Case 5 Group I Slightly limited flexion of right elbow after simple supracondylar fracture

Fig 31 Case 8 Group I Very marked valgus supracondylar fracture of left elbow The immediate result appeared good

Fig 32 Case 30 Group I Markedly limited flexion and very pronounced valgus after simple supracondylar fracture

under anesthesia hyperflexion for one week Slow improvement under mobilization and massage Discharged with approximately normal motion, October 16th Examination April 1914 Some fullness in region of external condyle Normal carrying angle flexion and extension Measurements Flexion 35° extension 180° of both elbows

CASE 73 Monte K age 8 Fracture and slight displacement of the left external condyle February 25 1911 Hyperflexion for one week mobilization and massage for two and one half weeks Discharged with nearly normal motion Examination April 1914 Normal flexion and extension and carrying angle Measurements Flexion 35° extension 185° of both elbows

GROUP B

CASE 74 Milton T age 8 F used fracture of the right external condyle September 1 1912 Splint for one week mobilization and massage for three and one half weeks Discharged with normal flexion and extension The same findings when examined in December 1912

CASE 75 Joseph R age 6 Fracture without displacement of the right external condyle June 24 1913 Immobilized in partial extension for nine days Mobilization and massage for ten days after which the patient was discharged Examination April 1914 Some prominence in the region of fracture Normal flexion extension and carrying angle Flexion 30° extension 180° of both elbows

CASE 76 Ruby S age 4 Fracture of surgical neck and infraction of the external condyle of the right humerus September 15 1913 Immobilized for two weeks Mobilization and massage for a short period discharged with normal motions of the shoulder and elbow joints

GROUP C

CASE 77 Morris A age 6 Fracture of the right external condyle September 1 913 Immobilization for three weeks Mobilization and massage for two weeks discharged with a perfect result Latte treated when last seen October 15 1913

Fig 33 Case 3 Group I Marked limitation in flexion and slight valgus after supracondylar fracture of right humerus with very little displacement

Fig 34 Case 30 Group I Very marked valgus and somewhat limited flexion after completely reduced supracondylar fracture

Fig 35 Case 40 Group I Slight valgus and limited flexion after simple supracondylar fracture right humerus

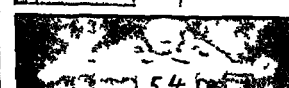
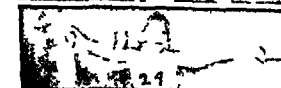
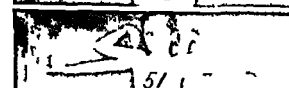
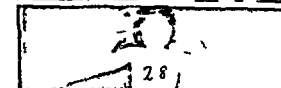
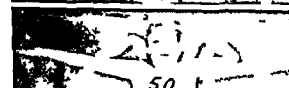
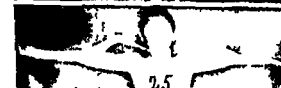
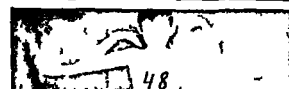
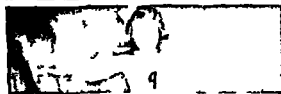
Fig 36 Case 41 Group I Slight valgus somewhat limited motions follow moderately displaced supracondylar fracture

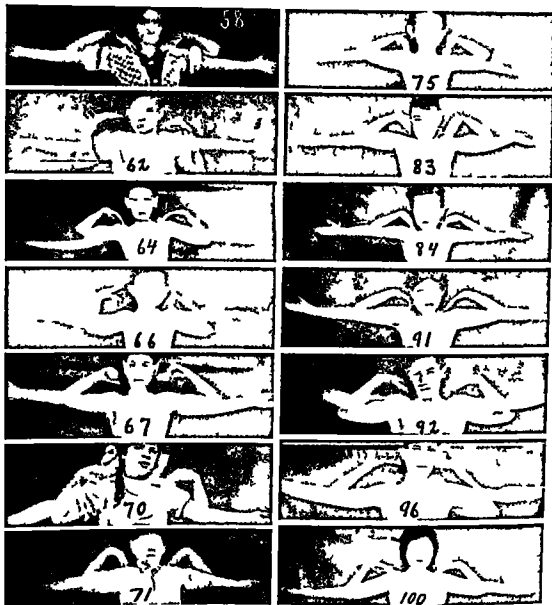
Fig 37 Case 48 Group C Increasingly limited motion after operation for supracondylar fracture

Fig 38 Case 50, Case 51 Perfect result Commuted fracture of terminal ends of trochlea left humerus

Fig 39 Case G A Perfect result after fracture and displacement of right external condyle

Fig 40 Case 54 Group A Perfect result Separation of the left epitrochlea





Figures show in situ results case numbers.

Fig 47 Case 58, Group B. Perfect result. Simple fracture of the right ternal condyle.

Fig 42 Case 6 Group D. Slightly limited motion and algus fte imperfectly reduced fracture of the right internal condyle.

Fig 43 Case 64 Group D. Limitation in motion following simple fracture of the right ternal condyle.

Fig 44 Case 66 Group D. Considerably limited flexion following fracture-displacement of the right epitrochlea.

Fig 4 Case 67 Group D. Moderately limited flexion and slight algus, simple fracture left epitrochlea.

Fig 46 Case 7 Group L. Limited extension and algus following fracture of the epitrochlea and trochlea of the left humerus.

Fig 47 Case 7 Group A. Perfect result. Fracture of internal condyle of the right ternal condyle.

Fig 48 Case 75 Group B. Perfect result. Fracture of the right external condyle.

(Legends continued opposite page)

CASE 78 Meyer H age 11 Comminuted fracture of the left external condyle August 15 1911 immobilized for three weeks mobilization and massage begun six weeks after the injury Discharged October 31 1911 with absolutely normal motion

GROUP D

CASE 79 Alex H age 5 Incomplete fracture of the external condyle of the right humerus June 10 1913 Immobilized in extension for 70 days mobilization and massage for four weeks Discharged with some limitation of motion Examination April 1914 Slight limitation in flexion and extension normal carrying angle Measurements Left flexion 35 extension 185 right flexion 40 extension 178

CASE 80 Morris K age 8 T-shaped fracture of the left external condyle February 25 1911 Discharged April 1 1911 with somewhat limited motion Examination April 1914 Slightly limited flexion and extension normal carrying angle Measurements Right flexion 35 extension 185 left flexion 35 extension 178

CASE 81 Louis C age 4 Fracture of the right external condyle with marked anterolateral displacement June 23 1913 In partial extension for two weeks then mobilization and massage Last examination October 15 1913 Full extension and flexion moderate varus deformity excessive callus at site of fracture

GROUP E

CASE 82 Rose B age 2 Fracture of the left external condyle June 4 1912 Mobilization and massage begun five weeks later continued for nine weeks before a fair functional result could be obtained Examination April 1914 Slight deformity in contour at the external condyle Carrying angle normal Slight limitation in flexion and extension Measurements Right flexion 35 extension 185 left flexion 40 extension 178

CASE 83 Hyman D age 8 Fracture and moderate displacement of the left external condyle August 1911 After immobilization for five weeks there was very marked limitation of motion *B isem nt force* on October 25th Mobilization and massage begun October 31st continued for two and one half months discharged with motion ranging between 35° flexion and 170 extension Examination April 1914 Moderate limitation in flexion and extension normal carrying angle Measurements Right flexion 35 extension 185 left flexion 42 extension 175

GROUP F

CASE 84 William W age 5 Fracture of the left external condyle with considerable displacement

Fig 49 Case 81 Group L Moderately limited motion following fracture displacement of the left external condyle Fig 50 Case 84 Group I Normal motion moderate limitation following operation for fracture displacement of the left external condyle

Fig 51 Case 80 Group D Normal motion slight limitation following fracture through upper end right ulna

and of the left olecranon with very slight displacement June 18 1913 After immobilization for ten days operation the displaced fragment being removed Mobilization and massage begun soon after Discharged after several weeks treatment with somewhat limited extension Examination April 1914 Considerable deformity of the humerus in the region of the external condyle Moderate valgus Normal flexion and extension (flexion 35 extension 180 of both elbows)

FRACTURES OF THE UPPER END OF THE ULNA

	Cases
Total number of cases	11
Perfect results	6
Hyperflexion cases	0
Group A—Immobilization in non hyperflexed positions early mobilization and massage	6
Imperfect result	5
Group B—Immobilization in on hyperflexed positions early mobilization and massage	2
Group C—Immobilization in non hyperflexed positions, early mobilization and massage	1
Group D—Operated upon	1

GROUP A

CASE 85 Robert K age 43 Fracture of the coronoid process of the right ulna October 13 1913 Immobilized for three days then mobilization and massage Discharged October 31st with practically normal motion Examination April 1914 Normal flexion and extension and carrying angle Measurements Flexion 45° extension 180 of both elbows

CASE 86 Louis H age 11 Fracture near the upper end of the left olecranon July 23 1912 In extension for one week then mobilization and massage Discharged August 10th with approximately normal motion Examination April 1914 Normal flexion and extension (flexion 40 extension 180 of both elbows) normal carrying angle

CASE 87 Samuel B age 5 Fracture of the right olecranon with very slight displacement October 27 1911 Extension for one week mobilization and massage for five weeks discharged with normal motion Not seen subsequently

CASE 88 Moses Z age 14 Comminuted fracture of the tip of the left olecranon February 1 1913 Extension for one week mobilization and massage for three weeks discharged with perfect motion Examination April 1914 Normal motion (flexion 35 extension 180° of both elbows) and carrying angle

CASE 89 Ben W age 4 Incomplete fracture of the left olecranon May 24 1913 Partial extension for ten days mobilization and massage for two weeks discharged with normal motion Examination April 1914 Normal motion and carrying

Fig 52 Case 9 Group B Slightly limited motion following fracture of the tip of the right olecranon

Fig 53 Case 90 Perfect result Commuted fracture of the head and neck of the left radius

Fig 54 Case 90 Slightly limited flexion following fracture through the head of the right radius. This is the best result seen (flexion 60 extension 175)

angle Measurement Right flexion 35° extension 185° left flexion 35° extension 180°

CASE 90 Abraham S. age 9 Impacted fracture of the left olecranon with slight posterior displacement April 25 1913 Extension for 12 days mobilization and massage for one week Examination April 1914 Normal motion (flexion 35° extension 180° (both elbows) and carrying angle

GROUP B

CASE 91 Mary I. age 10 1/2 Fracture through the upper end of the right ulna with medial placement March 14 1913 Extension for ten days mobilization and massage for 5 weeks Examination April 1914 Normal flexion and extension (flexion 35° extension 185° (both elbows) Slight return

CASE 92 George S. age 22 Fracture and upward displacement of the tip of the right olecranon November 14 1912 Extension for two weeks mobilization and massage for two weeks Examination April 1914 Slightly limited flexion and extension Small bony mass in the triceps immediately above olecranon Measurement Left flexion 40° extension 185° right flexion 45° extension 178°

GROUP C

CASE 93 Rubin J. age 14 Fracture of the right olecranon March 3 1911 Extension for three weeks Mobilization and massage for three and one-half weeks discharged with almost perfect motion Examination April 1914 Slight hollow one inch below the tip of the olecranon Some limitation in flexion Measurement Left flexion 35° extension 185° right flexion 43° extension 190°

CASE 94 Thomas McK. age 16 Fracture of the left olecranon February 15 1911 Extension for four weeks then free use of the elbow for three weeks Result unsatisfactory referred for mobilization and massage Motion then was flexion to 90° extension to 150° Some improvement at under mobilization and massage but when last seen in May 1911 motion was still markedly limited and result considered very unsatisfactory

GROUP D

CASE 95 Samuel I. age 45 Fracture of the olecranon June 20 1912 Operation (at another institution) with suture of the displaced fragment Immobilized in extension for five weeks Motion then between 110° and 170° Some improvement during several weeks mobilization and massage Patient discontinued treatment no probability of very satisfactory result

FRACTURES OF THE UPPER END OF THE RADIUS

Total number of cases	Cases
Perfect result	5
Hyperflexion by medial motion and massage	4
Semi-flexion by medial motion and massage	1
Imperfect result	1
Semi-flexion late mobilization and massage	1

CASE 96 Benjamin B. age 24 Comminuted fracture of the head and neck of the left radius October 30 1913 Well reduced by hyperflexion the position maintained for five days Mobilization and massage begun May 1914 the consilience effusion in and around the joint Discharged well after four weeks Examination April 1914 Normal flexion and extension normal carrying angle Measurements Flexion 110° extension 190° of both elbows

CASE 97 Samuel I. age 21 Fracture of the neck of the left radius May 18 1913 Immobilized in hyperflexion on May 20th Mobilization and massage begun May 27th Discharged with normal motion June 12th Examination April 1914 Full flexion and extension normal carrying angle Measurement Right flexion 50° extension 180° left flexion 45° extension 190°

CASE 98 Ben T. age 9 Fracture through the neck of the right radius August 6 1913 Accurate reduction by hyperflexion The position maintained for ten days Mobilization and massage for ten days Discharged with normal motion Examination October 1913 Normal flexion and extension Flexion 35° extension 185° of both elbows

CASE 99 Samuel P. age 5 Impacted fracture of the neck of the radius and fracture of the olecranon with slight displacement (right elbow) September 20 1911 Semi-flexion for six days Mobilization and massage for three weeks at end of which time motion was approximately normal Examination November 1911 Normal flexion and extension normal carrying angle

CASE 100 Isaac I. age 16 Fracture through the head of the right radius December 12 1911 Immobilized for 10 weeks at another institution for three additional weeks at the clinic By use of the very pronounced limitation of motion on January 18 1912 Mobilization and massage begun immediately after continued through February when the patient was discharged with some limitation of motion Examination April 1914 Some limitation in flexion normal carrying angle Measurement Left flexion 35° extension 180° right flexion 40° extension 180°

CONTRIBUTION TO THE CURE OF CANCER OF THE UTERUS BY
CURRETTING FOR DIAGNOSIS¹

BY H. J. BOLDT, M.D., IACSS, NEW YORK

BEFORE presenting for your consideration the detail of the case which induced me to address you on the subject chosen permit me to give what are practically a few extracts concerning the pathology of cancer—particularly of uterine cancer—from the work of Schottlander and Kermauner. And I may add for the benefit of those interested in the subject that the book written by our colleague Dr. Thomas S. Cullen is without equal in the English language.

Schottlander and Kermauner's classification is as follows:

Cancerous tumors with typical epithelial arrangement

Pavement epithelium—canceroid

High adenomatous cylindrical cell cancer (malignant adenoma) and

Tumors with atypical epithelial arrangement

The cancer or carcinoma simplex

Solid cancer Nests filled solidly with epithelium (in the tissue) Primary solid carcinomata never take a glandular character

Pavement epithelium cancer is divided into ripe middle ripe and unripe. The individual nests are called ripe when distinctly crenated cells are present middle-ripe and unripe when crenation is absent it being immaterial whether cornification is present or not. Between middle ripe and unripe or immature nests we differentiate in the sense that in the middle ripe a larger number of polygonal even well defined cells are present whereas in the unripe they show no cornification the small round or elongated formed or irregularly formed elements being in preponderance.

Labre Domergue and Bard and Borst have also accepted a similar division.

It is advisable to divide carcinoma of the uterus into primarily solid (secondarily occasionally glandular like) and into primarily glandular (secondarily frequently solid) carcinoma. The primarily solid carcinoma are

subdivided into ripe middle ripe and unripe without consideration as to the duration of the disease taking into consideration only the morphology of the nests and under ripe those forms are included which give the principal characters of pavement epithelium.

The primarily glandular carcinomata occur very seldom in the form of pure glandular formations with single layer epithelium—adenoma malignum—usually superimposed layers are formed in addition whereby solid nests may form secondarily.

These glandular carcinomata the so-called adenocarcinomata in which originally the glandular type is well marked and to which also the papillary form belongs one may contrast with the carcinoma glandulare in which by primary filling of the glandulum the glandular character becomes soon obliterated. Both forms combine and in an advanced stage cannot be differentiated.

The primarily solid carcinomata are most frequently unripe seldom ripe. The remainder of scirrhus cancers in contrast with the non scirrhus, is small. The primarily solid carcinomata are more often medullary than scirrhus more often but little stroma is recognized between the nests rather than a large quantity.

A very important point is made by Lubarsch with which the greater number of authoritative pathologists coincide. Lubarsch states it is impossible for him to diagnose cancer no matter by what method until there are positive and clear signs of the destructiveness of the growth. He says that he is aware that gynecologists ask more and believe that they can accomplish more but as a matter of fact only a probability can be assumed unless evidence of destructiveness is present. Just as Virchow said many years ago it is maintained by Lonsick, Ribbert, Borst, Albrecht, Henke, Herzheimer, Lewin and many others that a more or less complete identity exists between normal cells



Fig. Microphotograph of section of scrapings removed 1 week after curettage by Dr. Ladinsky.

and those of incipient cancer. Not a single investigator has been able to demonstrate a carcinoma just beginning without the criticism of subjective interpretation.

So long as experimentation leaves us so obstinately in the lurch we are still compelled as formerly to rely on experience to draw conclusions from those cases invariably recognized by all as cancer to convey these conclusions to the beginning of the disease and by this means in general or in the individual case to reconstruct the diagnosis of the respective early stage.

By this again a subjective moment enters into the discussion so that a definite conclusion need not soon be expected even in this small chapter of the cancer question.

Still, we cannot fully endorse the resignation of Lubarsch concerning the diagnosis of cancer in all instances when no destruent growth is present. It is a further question in which stage recognition is possible if there are specific morphological criteria for a beginning carcinoma—a question which is generally rejected.

The time is past when changes in the epithelium particularly when an ingrowth of the latter is shown may be indiscriminately designated as cancer. With the aid of

clinical observation on the basis of experimentation it has been proved that such occurrences may take place in entirely cancer-free uteri and uteri remaining free of cancer. The main distinguishing reliance is placed upon the formal character of the cells and nuclei. The absence of mitoses and the typical arrangement of the epithelium are dwelt upon by Acri. In suspicious carcinoma there is irregularity of the cells in size and form as well as large nuclei rich in chromatin. And Schauenstein speaks of the poor staining of the protoplasm and eosinophilia.

Attention is called to the superimposing of the epithelia in which the epithelial lining in ward sometimes take on clubshaped and in which occasionally large nuclei are present in the so-called or genuine pregnancy glands and which may easily lead to the diagnosis of cancer so that in some pictures a diagnosis must be refrained from because only normal cell formations may be present.

It is quite easy to recognize a glandular carcinoma after the type of adenoma malignum with atypical superimposed layers of epithelium (so-called adenocarcinoma) or a papillary glandular carcinoma but the distinction may become very difficult if the chief characteristic feature of malignant adenoma—single layer epithelium—remains.

But now let us take another point of view strictly from the standpoint of the clinician where a positive diagnosis is withheld although a beginning malignant adenoma can not be excluded. From my point of view I would advise a vaginal hysterectomy in such a case unless there were very important reasons to keep the patient under further observation and then this should be done on the patient's responsibility.

It is certain that there are no specific morphological criteria for the recognition of the first forming carcinoma cell. On the other hand it seems possible in some instances of cancer where there is an absence of destruent growth to make the correct diagnosis even if the epithelium is still in situ.

We must emphasize not only the atypical direction of the growing but rather the faultiness of structure. We are of the opinion that



Fig. 1. Cervix cancer



Fig. 2. Show cancer into fundus

especially in the earliest stages the faulty structure is particularly marked especially in primarily solid less so in primarily glandular (secondary solid) carcinomata and this facilitates recognition

To obtain an opinion one must know the morphologic physiologic and formal qualities of the parent cells. Also the clinical data the macroscopic appearance and the direction of the sections must be considered

A surface growth alone of cancer of the uterus in the sense that only the mucosa is affected is very rare but still it may occur in the primarily solid as well as in the primarily glandular carcinomata (Case recently seen cited at conclusion). Cullen says that solid carcinomata penetrate more rapidly into the depth than the glandular but in our opinion this may vary

We have not observed the proliferation of gland into lymphatic vessels and in case of glandular carcinomata in a histological sense such proliferation is likely to be long delayed

The propagation of cancer to the uterus by the lymphatics from the parametria is not as exceptional as is generally taught. The deformation of the uterus is important

While it is possible to ascertain in the greater number of cases whether a carcinoma has its primary seat in the corpus or in the

collum this does not apply to the distinction between cervix and portio cancer

Among the solid cancers the immature which occur more frequently are more malignant than the others. This holds good for the large and medium sized tumors. In the latter the adjoining structures are affected one third less often

A collum carcinoma if somewhat advanced — when the question of a pure malignant adenoma may be excluded — cannot as a rule be distinguished from a corporal cancer by microscopical examination because the cervical epithelium loses its original characteristics and resembles the corporal epithelium

A clinical factor ascertained by local examination is that infiltrated parametria may be free from cancer whereas yielding soft parametria may be carcinomatous. But stress must be laid on the presence of small parametric lymph nodules which may be found carcinomatous in otherwise free connective tissue

The vagina is involved in from 40 to 50 per cent of all cases but not necessarily in its superficial surface but lymphatically. Hence the necessity to try to extirpate not less than the upper one third of the vagina

One must not be led entirely by the palpa-

consisted of many mucous membrane-shreds, among which was a larger formation about the size of a small hazel nut. This showed histologically a typical adenocarcinoma whereas the remaining particles were free from suspicion of carcinoma. Extirpation of the uterus was done eight days later.

To the astonishment of the author it was a myomatous uterus about which not a trace of carcinoma was found even the numerous parts of the uterine wall were examined histologically. The patient remained well. The author admits that in this case it must be accepted that the carcinoma was entirely removed by the curetting. One may deduce however, from the shape of the piece removed that it was a small carcinomatous polypus so that the possibility of complete obliteration by curetting becomes understandable. A third case according to von Heisemann was seen by Koblanck. In the case of that patient it did not concern a polypoid cancerous proliferation but a pavement epithelium carcinoma of the uterine body. After extirpation of the uterus it was impossible to find any further evidence of carcinoma. The endometrium of the somewhat enlarged uterus was in a normal condition throughout in so far as it was not removed by the curetting. This form of carcinoma is rare and always begins on the superficial surface of the mucosa with metaplastic transformation of the superficial epithelium.

A fourth case is described by Hei. () The patient was 41 years old and for three months complained of irregular bleeding with leucorrhoea of foul odor. After curetting the diagnosis of adenocarcinoma was made by Privy Councillor von Heisemann. But because the sister of the patient had succumbed to a hysterectomy for cancer of the uterus a radical operation was declined. Nothing further was done and after the lapse of some time the patient returned for reexamination. The uterus had decreased in size and the suspicious manifestations (bleeding and leucorrhoea) had disappeared. Now after three years the patient is still healthy and may be considered cured at least clinically. But here a repeated histological examination has not proved that the patient is also cured

anatomically. No one can say whether in this instance we may not have a latent stage of carcinoma which according to Brett schneider (8) and Fromme (9) may occur. Only the future can decide this question. At all events so far as concerns this case Prym believes that it concerned only a very circumscribed carcinomatous polypus and that probably the special anatomical conditions made the complete removal of the carcinomatous tissue intelligible.

It is not possible to compare these cases with the one related by me. The sections which I examined and had examined absolutely do not show the early stages which according to Ruge and Prym make a complete eradication by curetting intelligible. It did not concern a carcinomatous degeneration of a polypoid proliferation that was limited to the mucosa because as the sections show beyond doubt the carcinoma had penetrated deeply into the myometrium. What may occur in special anatomical disposition is not conceivable in our case. For this reason I express as my belief that if no accidental mix-up happened with the specimens this is the first case of such a nature that has ever been observed.

As subsequent clinical and pathological examinations showed the patient is cured not only clinically but also anatomically and inasmuch as we cannot speak of a spontaneous cure in cancer we must assume that the carcinomatous structure was removed entirely by curetting unless an accidental interchange of scrapings occurred. The patient was last seen in November 1914 and was then in perfect health subjectively and objectively.

Since seeing the case reported in the foregoing I have had the opportunity of seeing an instance of early adenocarcinoma in a patient in whom no suspicion of cancer was present. The curetting was done in the course of operations for descent of the uterus and vagina.

B. McC., 36 years old, descensus of uterus and vagina. The scrapings were sent to the laboratory as is done in nearly every instance. The report showed the presence of adenocarcinoma. In view of the extensive plastic operation and the ventral

suspension I hesitated to subject her to the extirpation of the uterus but the microscopical pictures were so unmistakable that upon advice I yielded without doing another curetting for diagnosis. Serial sections from all parts of the uterine mucosa failed to show further evidence of malignancy.

Pathological report by Victor Neujean

Specimen consists of the uterus removed by total hysterectomy with both adnexa. The mucous membrane of the organ does not show macroscopical or any suspicion of malignancy. The mucosa presents a few circumscribed areas of hyperemia, these congestive and hyperplastic processes seem to be more marked in the tubal corners. Microscopical examination. In order to discover any trace of malignant growth practically the whole mucosa was examined microscopically. Generally speaking the uterine mucous membrane is somewhat thickened and shows slight hyperplasia of the interstitial cells and some hyperplasia and hypertrophy of the uterine glands, the number of which does not seem to be much increased. In some places the interstitial changes and the hyperplastic changes of the gland are more marked especially in the tubal corners. But although in those regions the glands are numerous and show some irregularity in the disposition of the epithelial cells, nothing suggestive of malignancy could be found, the glandular individuality being perfectly maintained through-

out. The myometrium is dense in texture and shows marked new formation of connective tissue with corresponding decrease in the number of the epithelial cells. The walls of the blood vessels are thickened by new growth of connective tissue especially in the intima. Diagnosis: Chronic metritis and endometritis.

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OVARIAN TUMORS IN PREGNANCY¹

WITH REPORT OF A CASE OF A SOLID TUMOR

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DURING the summer of 1913 a woman aged 32 pregnant about three months was sent to the writer. Upon examination there was found on the left side of the abdomen a mass apparently about the size of a fetal head, hard and freely movable. The fundus of the uterus was easily palpable about two fingers breadth above the pubis. She stated that five months earlier she had noticed a mass in the lower part of the abdomen which she said had gradually increased in size. There had been a slight bleeding about one week before the patient was seen. A diagnosis was made of ovarian cyst accompanying pregnancy and operation was advised. Laparotomy was done September 9 and the tumor excised. It was easily removed as there

were no adhesions and the tumor was attached to a pedicle about four inches long. The mass weighed 292 grams. It was 10.5 cm long by 8.5 cm broad and 6.5 cm thick. It was of an elongated spheroidal shape and white in color. The consistency was firm and hard. The surface was covered by a firm glistening thin capsule. The cut surface was even and homogeneous, some tiny spaces being seen which were probably due to the dropping out of small particles of tissue which had undergone myxomatous degeneration.

Microscopically the mass proved to be a fibromyoma which had undergone myxomatous degeneration. One portion of the mass was composed of almost pure unstriped muscle tissue. The patient made an unevent-

ful recovery left the hospital and was lost sight of. Nothing has been heard of the subsequent labor but as the woman was in her third pregnancy and the former labors had been normal it is supposed that it presented nothing out of the ordinary.

Upon looking up the literature it appeared that solid tumors of the ovary are not at all common and that they are particularly rare in connection with pregnancy as is of course the truth with any type of ovarian tumor. It therefore seemed not unjustified to report the case and at the same time to enter into a brief discussion of the relationship of these tumors to pregnancy. With the exception of a few of the more important articles the bibliography accompanying this article includes only the titles appearing since 1903 in which year McKerron's paper was published. Since that date there has been no systematic search of the literature.

FREQUENCY

As to the frequency of the occurrence of these tumors we find in the literature the results of the inquiries of several investigators. Fehling found in 17,832 deliveries only 40 cases of ovarian tumor. Lohlein found 2 cases in 15,000 pregnancies. McKerron estimates the usual frequency to be about one in 1,500 pregnancies. William L. Swan of Johns Hopkins made a most thorough search of the literature from 1861 up to the time of the publication of his paper in 1898 and was able to find only 14 undoubted cases of solid tumor. McKerron in 1903 in what is probably the most exhaustive publication upon this subject in English bases his paper upon a series of 1,290 cases of which the character of the tumor may be stated with reasonable certainty in 862. Of these fibromata or solid adenomata were present in only 19 cases or slightly over 2 per cent. Dermoids were present in almost a quarter of his cases. The greater frequency of dermoids he ascribes to the fact that they are for the most part small and give rise to no symptoms until the trauma of pregnancy or labor causes some complication. Swan found solid tumors to be a little more frequent than McKerron as his statistics show them to be present in



Ovary tumor. Elongated spheroidal shape white in color.

6.8 per cent. Jetter in 166 cases found 6.6 per cent solid ones. Puech and Vanverts state that solid tumors are found in 2.5 per cent of the cases of ovarian tumor in pregnancy thus agreeing with McKerron. While the figures in various reports vary somewhat it still remains that solid tumor is an infrequent accompaniment of pregnancy. I found no case of bilateral fibroid tumor of the ovary during pregnancy.

INFLUENCE OF TUMOR ON PREGNANCY

In the great majority of cases it may safely be said that the progress of the pregnancy will not be materially influenced. Ovarian tumors are removed at present as a rule before they attain a size which will be sufficient to cause any symptoms attributable to pressure. Even today however occasional cases are reported which are an exception to this rule. Torsion of the pedicle is an occurrence which is observed with fair frequency. It may be said in general that this complication is found about three times as often in ovarian tumors associated with pregnancy as in those found apart from that condition. McKerron found sixty cases of torsion in his series and states that he believes it to happen in one out of eight cases. Torsion is much more apt to occur in tumors situated in the abdomen than in those occupying the pelvic cavity.

Torsion of the uterus to which Schultz

drew attention in 1898 is perhaps more common than is usually believed McKerron finds six cases and quotes Schultze as having seen several cases in which the twisting was as great as 180 degrees The circulation of the uterus may be disturbed to a sufficient extent by the more marked degrees of torsion to bring about abortion

Very large tumors predispose to abortion nature apparently taking this means of relieving the intra-abdominal pressure Cases have been seen however in which after delivery the remaining tumor mass was so large that the abdomen had apparently not decreased

DIAGNOSIS

There seems to be no way in which a solid tumor may be distinguished from a cystic one The hardness and lack of fluctuation may suggest the presence of a non cystic mass but these are so difficult of determination that little reliance may be placed upon them and the diagnosis of solid tumor will as a rule be made after opening the abdomen Small tumors may give no symptoms whatever and the discovery of their presence be made first by a vaginal examination at the time of labor The tumors are often recognized with great ease especially early in pregnancy by their rounded form and mobility by which they may be differentiated from the uterus which lies in the middle of the abdomen If the tumor lies behind the uterus or if it be an intraligamentous one the differentiation from retroflexed gravid uterus or from tubal pregnancy may be difficult The question as to whether a given tumor is ovarian or a uterine fibroid of the gravid uterus is in some cases a very difficult one to decide The ovarian mass is more movable and may fluctuate Ovarian fibromata are often accompanied by ascites The uterine fibroid will usually move with the uterus The more close connection of the uterine tumor with the uterus will be demonstrated by pulling down the cervix as suggested by Schroeder In the case of an ovarian fibroid its distinction from a uterine fibroid is sometimes very difficult Free fluid in the peritoneal cavity may suggest an ovarian growth in cases of doubt

An ovarian tumor in the pouch of Douglas in the early months may simulate a retro flexed pregnant uterus One of the most valuable signs here is the direction of the cervix In the retroflexed uterus this will be directed forward and upward while in the case of a tumor in Douglas pouch the direction is unchanged although the level of the os externum may be changed by the crowding upward of the uterus Pelvic exostoses may be confused with tumors lying in Douglas pouch but rectal examination will usually enable one to exclude this condition

Floating kidney may simulate ovarian tumor during pregnancy but this will happen so rarely as to be of little practical importance

PROGNOSIS

The prognosis as to the mother in cases of ovarian tumor associated with pregnancy depends largely upon the location of the tumor the promptness with which it is recognized and upon the skill of those by whom she is to be attended The influence exercised by a small tumor or even in many cases by a large one upon the course of the pregnancy is frequently very slight During the pregnancy the complication most to be feared is twisting of the pedicle These cases however almost always may be saved by prompt operation McKerron refers to 64 cases of torsion of the pedicle of which 52 recovered many of which were relieved by operative interference The size of the tumor is of much less importance than its location and the advice which may be given by practitioners poorly informed upon the subject to treat a small tumor expectantly is often very ill founded Indeed a small tumor is more apt than a very large one to occupy the pelvic cavity and become an obstruction to labor if allowed to remain till term

The most rapidly fatal of accidents during pregnancy is rupture If the cyst be one which has suppurated the danger becomes exceedingly great It must also be observed that pregnancy seems to favor suppuration in ovarian cysts It may be expected and this fact should be taken into account when formulating a decision as to the course to

pursue in a given case that twisting of the pedicle rupture suppuration or suppuration and rupture may be expected to happen in about one out of four cases and that no period of pregnancy is more exempt from such accidents than another. It must therefore be remembered by those who see these cases that the life of the woman is endangered throughout the entire pregnancy by the presence of the new growth. As McKerron says the danger lies mainly in the complications to which such growths are liable and early recognition constitutes the greatest safeguard. The prognosis for the mother in whom the tumor is diagnosed and removed at once is very good her operative risk being scarcely if at all greater than the risk assumed by a woman undergoing the same procedure in the non pregnant condition. The chances for the child are also immensely improved by the removal of the mass which might cause great obstruction to labor.

TREATMENT

The proposition may be stated at once that if an ovarian tumor is recognized during pregnancy the proper mode of procedure is its immediate removal. The danger to the mother is slight and the risk to the fetus is greatly lessened. During the early half of the nineteenth century the treatment of this condition confined itself to the management of the case after labor began there being but little done to ameliorate the condition during pregnancy. Labor was induced in those cases in which the location or size of the mass rendered it probable that it might become an obstruction to labor. Very large cysts were tapped it being found that tapping was no more dangerous during labor than at other times. The first operation for the removal of an ovarian tumor undertaken with the full knowledge that pregnancy existed was done by Sir Spencer Wells in 1869. This operation was done upon a woman whose ovarian cyst had ruptured at the end of her third month of pregnancy. The woman recovered and went to term.

In 720 of McKerron's series of cases the condition was allowed to remain until pregnancy terminated. Of these 152 women

died and this mortality would have been greater if in some of the cases operation had not been done during labor or immediately thereafter. Thirty per cent of the children perished.

Spencer says that during the first half of pregnancy all ovarian tumors should be removed wherever their situation and whatever their size. He states an exception in the case of bilateral tumors causing no symptoms in a patient who is childless or if operation be done part of one ovary should be left behind. During the second half of pregnancy all large ovarian tumors and ruptured inflamed and strangulated tumors should be immediately removed. Small tumors which are in the abdomen or which can be easily pushed up out of the pelvis in the knee-chest or Trendelenburg position should be watched and if no untoward symptoms arise be removed at the end of pregnancy or toward the end of the first stage of labor or after delivery. The writer would be rather more radical than Spencer and would incline to the removal of any ovarian growth at the earliest practicable time after its discovery herein agreeing with E. P. Davis.

Removal by means of an abdominal incision is usually the method of preference although a few writers notably Duhrssen urge the vaginal route. Bandler believes vaginal celiotomy to be contra indicated in the presence of a pregnant uterus. Martin uses a posterior colpotomy in small tumors lying low in the pelvis removing large ones by laparotomy. The percentage of abortion seems to be much more favorable in the cases subjected to laparotomy than in those subjected to vaginal section for E. P. Davis finds the interruptions of pregnancy caused by the latter mode of attack to amount to 49 per cent. In a series of 284 cases of ovariectomy collected by Flatau in 1907 abortion followed in only 17 per cent. Wahmer gives the abortion rate as 22.4 per cent. The maternal mortality is scarcely greater during pregnancy than at any other time. According to Osier it is 5.9 per cent. To Wahmer 5.45 per cent. To Vinay 4.09 per cent. To Orgler 2.7 per cent. and Grafe gives it as only 2.3 per cent. When one contrasts the

above figures with McKerron's statement that 21 per cent of the cases in his series which were not interfered with but were allowed to go to term died it does not seem that there can be any hesitation as to the proper course to pursue.

The operation should consume the minimum of time and every care should be taken that the uterus and appendages be not traumatized. The writer does not agree with the statement of Davis made in 1911 as to the value of chloroform as an anæsthetic in these cases believing that the recent investigations as to the destructive influence of this drug upon the parenchymatous organs render it peculiarly unfit for use in the pregnant woman.

Williams and Hirst believe that in cases in which the tumor remains unrecognized until the last month of pregnancy the removal of the tumor should be followed immediately by a supplementary cesarean section to relieve the woman of the additional strain of labor soon after a major operation. This mode of procedure was adopted by the writer in the case of a primipara of 39 who was exceedingly anxious to save her babe her pregnancy having occurred after twelve years of marriage.

In those cases which are not seen until the woman is in labor the treatment depends largely upon the condition of the patient when first seen. If the case has been handled in any but the most aseptic manner the tumor should be pushed up out of the pelvis if possible and delivery accomplished either spontaneously or operatively through the vagina. Delivery by forcefully extracting the child alongside the mass should never be attempted. If reposition be impossible puncture or incision and drainage of the tumor if it be a cystic one should be done after which delivery should be accomplished as speedily as possible and the sac should be removed by abdominal incision or colpotomy within twenty-four hours. If the case be a clean one in a well conducted hospital the mass may be removed at once by laparotomy and delivery accomplished by hysterotomy or from below at once. In cases in which labor has not begun or in which there is little

or no dilatation the writer inclines to delivery by cesarean.

The writer would urge that all pregnant women be subjected to careful routine examination during pregnancy preferably early in order that ovarian masses if present may be detected in time to permit operation at the time of greatest safety. The treatment of this condition may be briefly summarized as follows:

1 Ovarian tumors are not particularly common during pregnancy but enough cases are on record to make it essential that they be systematically looked for.

2 Operation should be done as early as possible preferably during the early months of pregnancy the operation being demonstrated to be very safe for the mother and the danger of abortion being but a fraction greater than the danger of abortion in the cases treated expectantly and less than the danger to the child in those allowed to go to term unrecognized.

3 In case of complication twisting of the pedicle rupture of the cyst or suppuration of the cyst operation must be done at once.

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COMPLETE REMOVAL OF ADENOCARCINOMA OF UTERUS BY EXPLORATORY CURETTAGE

WITH REPORT OF THREE CASES¹

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HISTORICAL

ANY incident that may throw additional light, however faint, on the important and all absorbing problem of cancer is deserving of our investigation and study.

That an early adenocarcinoma of the uterus can be completely removed by curettage was established as an undoubted scientific fact in 1896. In that year Gessner (1) read a paper on "The Value and Technique of Exploratory Curettage" before the Obstetrical and Gynecological Society of Berlin and incidentally reported two cases. His report was accepted without a dissenting voice which was in marked contrast to the action of the same society ten years before. When in 1886 Dr. Martin demonstrated a uterus from which the cancerous growth was removed by curettage the members of the Society regarded it as a case of mistaken diagnosis and the extirpation as unjustified. However, with the exception of an item to which I shall later refer, I can find no record in the literature since then that the radical removal of an early adenocarcinoma by the curette has ever been questioned.

The cases of Gessner, the first of which is exceedingly interesting and instructive, are as follows:

CASE 1. The woman was 33 years old, sterile, suffering from irregular menses and discharge. Owing to the age of the patient and the size of the uterus there was no thought of possible cancer of the uterus. The microscopic examination of the curetted tissue revealed adenocarcinoma. From a clinical point of view there was doubt as to the correctness of the diagnosis which doubt was all the more strengthened by the fact that the extirpated uterus was small and upon microscopic examination by Gebhard, of eight different portions showed no evidence of cancer. For several years this case served as an example in the clinic of mistaken diagnosis. Upon examination of the

uterus with the magnifying glass Gessner could find no point of the mucosa which was suspicious of cancer. Convinced however of the correctness of the microscopical diagnosis he went to the trouble of having the whole uterus sectioned. He began with the fundus so that his patience was sorely tried. Above the internal os in the posterior wall an area 6 mm. in diameter was found which showed adenocarcinoma.

CASE 2. Woman 52 years old, nullipara. Menopause for seven years. For six months suffered from profuse, often bloody discharge.

In the last month or so marked hemorrhage, no pain. Examination: Uterus small, retroflexed. Curettage showed adenocarcinoma of corpus uteri. Uterus extirpated. No sign of cancer in the extirpated uterus.

Gessner believed that in this case, in spite of the failure to find cancer in the extirpated uterus, the patient was suffering from cancer and the microscopical diagnosis of the scrapings was not a case of mistaken diagnosis.

In commenting on the first case Gessner made the following statement: "I consider it entirely possible to remove a superficial cancer of the mucosa of the uterus so radically with the curette that no traces of cancer can be demonstrated in the extirpated uterus and that this is just as possible as the complete removal by the curette of an inflamed, degenerated area of the mucosa."

In discussing Gessner's paper Veit (2), Kiefer (3) and P. Ruge (4) reported similar cases as follows:

CASE 3. Veit cited the case of Dr. Martin of adenocarcinoma referred to above and gave credit to Schroeder for emphasizing the importance of microscopical diagnosis in gynecological cases and to P. Ruge for demonstrating the value of diagnostic curettage. He commented on the fact that it was then accepted as a case of mistaken diagnosis.

Kiefer reported the following case from Martin's clinic:

¹Read before Section of Obstetrics and Gynecology, New York Academy of Medicine, October 7, 1924; before the Clinical Society, New York Polyclinic Medical School and Hospital, November 19, 1924; and before the Eastern Medical Society, November 3, 1924.

CASE 4 Curettage revealed adenocarcinoma in the uterus in spite of the most zealous search nothing malignant could be found. He considered these as "The favorable but at the same time rare, cases in which a beginning carcinoma causes sufficient symptoms to lead a patient to a physician who does the right thing." He regarded the prognosis in these cases as undoubtedly good.

P Ruge cited a case he observed in June 1886.

CASE 5 He curetted a uterus because of bleeding for several months. The scrapings were so unsuspicious in appearance that the patient was allowed to go home.

The microscopic examination made by P Ruge, showed malignant cy. The patient was notified of this and came back for total extirpation. The extirpated uterus did not show any cancer after a long search a very slight suspicious spot was found in the reformed mucosa.

Very remarkable however is the fact that six months after operation Ruge's patient died of carcinoma of the liver although the primary carcinoma at the time of operation was only at its beginning.

Ruge presented the case as illustrating early recurrences in spite of removal of the disease in its incipency. (This case is in all probability the one operated by Dr Schroeder and is later reported by Stratz.)

In 1897 Krukenberg (5) reported a case of carcinomatous polyp.

CASE 6 Patient 32 years old nullipara. Had hemorrhages in the intramenstrual periods. Examination revealed a polyp situated on the anterior lip of the cervix while the base of the polyp gradually merged into the mucous membrane of the cervix. Curettage showed an ordinary endometrial polyp was excised. Microscopical diagnosis (by Ruge) Malignant degeneration of Polyp. The patient refusing an operation was examined at half yearly intervals by her physician. A year and one half after the excision of the polyp the patient showed no recurrence but the further course of the case could not be obtained.

In 1898 von Franque (6) reported the following case.

CASE 7 Patient 50 years old bled repeatedly after four years of menopause. Exploratory curettage revealed "carcinomatous changes of the surface and glandular epithelium" and total extirpation was done. The extirpated uterus seemed to be free from cancer. Microscopic examination of numerous sections of the uterus revealed a few cancer cells in one small area which was confined to the mucosa.

CASE 8 In 1903 Zweifel, (7) in a discussion before the Medical Society of Leipzig stated that he

had seen one case in which the diagnostic curettage showed adenocarcinoma while the extirpated uterus gave no evidence of it.

In 1905 Vassmer (8) published a paper under the caption of "Can a permanent cure of a beginning adenocarcinoma of the uterus be effected by curettage?" and reported the following case.

CASE 9 In 1901 he received a specimen of uterine scrapings for microscopical examination with the attached note "Patient tuberculous, 45 years of age bled for 14 days. His diagnosis was incipient adenocarcinoma and he wrote to the physician recommending total extirpation. Later on he learned that the physician had attempted total extirpation but owing to severe hemorrhage, had to give it up. As the hemorrhage from the uterine mucosa ceased after the attempt at extirpation the physician did another curettage and sent the material for microscopical examination to the pathological institute at Göttingen and received the surprising report that nothing malignant was found. The same negative result was reported after a third curettage also made in Göttingen. In order to obviate the possibility of an error on his part he sent the specimen which he had received from the first curettage to Göttingen and his findings of carcinoma were confirmed there. In his letter to Gessner Mundt of the Göttingen Institute made the following statement: "If we should suppose that the second and third scrapings covered the entire surface of the uterine mucous membrane we have here a case in which an incipient malignant tumor was removed by a single curettage." Professor Aschoff recalls an analogous case in which a similar finding was reported in that case when the uterus was extirpated he was exceedingly astonished to find no trace macroscopically or microscopically of cancer.

Dr Vassmer was certain that there was no mistake in the identity of the specimen sent to him and that the three specimens were obtained from the same patient. Dr Vassmer heard from the case four years later when she was still free from recurrence.

In 1910 Winzwarter (9) reported before the gynecological society of Vienna a rare case of polyp of the uterine mucosa which had undergone malignant degeneration.

CASE 10 Patient 66 years old five normal labors — last one twenty eight years ago. Menopause for fifteen years for four weeks she had bled profusely.

Examination. Serous vaginal discharge a polyp the size of a guilder (twenty five-cent piece) with necrotic surface attached to the uterine wall projected into the vagina. Diagnostic curettage showed

carcino-sarcoma. Removal of tumor and vaginal hysterectomy. Cancer was found throughout the substance of the polyp whereas the wall of the uterus was entirely free from it.

In 1911 Chodounsly (10) published a case of carcinomatous polypus.

CASE 11. A woman 49 years old had suffered from severe uterine hemorrhage for some time. In the extirpated uterus he found in the fundus a tumor the size of a small apple brownish red in color sessile. Microscopic examination showed adenocarcinoma. Between the tumor and the neighboring mucous membrane there was a sharp line of demarcation. In the glands and the epithelium of the rest of the surface of the uterus no changes or metaplasia could be discovered.

In 1911 Ogorek (11) reported before the Obstetrical and Gynecological Society of Vienna a case of carcinomatous uterine polyp.

CASE 12. Woman 62 years old. In the body of the uterus was a polypoid adenoma the size of a hen's egg near this was another tumor the size of a hazelnut there were other intramural and subserous myomata. Carcinoma had developed on the tip of the polyp but neither in the pedicle nor in any other part of the uterus were there any signs of cancer.

In 1913 Graff (12) demonstrated before the Obstetrical and Gynecological Society of Vienna a case of Carcinomatous Uterine Polyp.

CASE 13. Specimen from a woman 32 years old V para. Patient admitted to hospital for persistent profuse bleeding. Examination revealed a submucous myoma the size of an egg attached to the posterior uterine wall on the left side. Enucleation of myoma. Microscopic examination showed primary glandular carcinoma developed from myoma. In view of these findings vaginal extirpation of the uterus was done. Histological examination of the various portions of the wall did not show the slightest signs of carcinoma. Dr. Graff calls attention to the apparently frequent coincidence of myoma (especially of submucous origin) and carcinoma.

In 1913 Hess (13) published a paper entitled Cure of a Case of Adenocarcinoma of the Uterus by Exploratory Curettage and reported the following case.

CASE 14. Woman 41 years old. Has had irregular uterine bleeding for three months and a foul smelling discharge. Vaginal examination revealed no marked changes but in view of the bleeding the foul smelling discharge and the history of carcinoma of her sister exploratory curettage was done. Dr. von Hansemann made the microscopic examination and reported undoubted adeno-

carcinoma. This diagnosis was confirmed by others. Radical operation was advised but in view of the bad result in the case of her sister the patient persistently refused. The patient continued to call for some time for further observation although no therapeutic measures were undertaken. After quite some time she appeared again for examination. Her symptoms were disappearing gradually the bleeding and especially the foul smelling discharge had disappeared. A reexamination (after four years) showed the woman to be perfectly healthy from a clinical standpoint.

Hess' paper stimulated further contributions to the subject in 1913 von Hansemann (14) in commenting on the case of Hess confirmed the diagnosis of undoubted carcinoma in that case and stated his belief that all parts of the tumor had been removed by the curette. He considered these cases as very rare and reported the following case from Dr. Koblanck's practice.

CASE 15. A girl seventeen years old was subjected to an exploratory curettage for suspected tumor. The microscopic examination proved undoubted carcinoma. The uterus was removed and examination of serial sections of the whole mucous membrane of the extirpated uterus did not show a single spot which looked like carcinoma. The mucous membrane of the slightly enlarged uterus was normal so far as it was not removed by the curette as was the musculature. The exploratory curettage had completely removed all traces of carcinoma.

In 1913 P. I. Ryd (15) reported a case of complete removal of carcinoma of the uterus by exploratory curettage.

CASE 16. Woman 49 years old (patient of Dr. Trebes, Bonn). Had profuse bleeding and foul smelling discharge for three months. Clinically there was a suspicion of carcinoma. On July 8, 1911, curetted material from the uterus was sent to the Bonn Pathological Institute for examination. Scrapings consisted of many shreds of mucous membrane and one mass about the size of a small hazelnut. The latter proved histologically to be a typical carcinoma while in the remaining particles there was no suspicion of carcinoma. The uterus was extirpated eight days later by Dr. Trebes. It proved to be a myomatous uterus in which no carcinoma could be seen. Most extensive sections of the wall were then examined histologically but nothing suspicious was found. According to an oral communication by Dr. Trebes the woman had remained well for two years.

The communication of Dr. Hess induced Dr. Ryd to look over the specimen again and he also prepared further sections. There was no doubt about the diagnosis. It was a small polypoid

N	Date	Reported by	Character of Growth	Lesion in Mucosa	Lesion in Polyp	Cure- ts followed by Extirpa- tion	Cure- ts followed by Extirpa- tion	Reason for not Extirpating the Uterus	Duration of Freedom from Recurrence
	1886	Marti (same case reported by Veit in 1896)	Adenocarcinoma	✓		✓			Not given
2	1896	Gessner	Adenocarcinoma	✓		x			Not given
3	1896	Gessner	Adenocarcinoma	✓		x			Not given
4	896	Kiefer	Adenocarcinoma	x		x			Not given
5	896 19 3	P. R. ge P. Strat	Adenocarcinoma	x		x			St months
6	897	Kruckenber	Adenocarcinoma		x		x	Patient refused operation	1 1/2 year
7	1897	von Franke	Adenocarcinoma	x		✓			
8	1902	Zweil	Adenocarcinoma	x		x			
9	1905	Vasame	Adenocarcinoma	x			✓	Extirpation at- tempted but was given up because of profuse hem- orrhage	4 years
10	9 0	Wimwa ler	Adenocarcinoma		x	✓			
	9	Chodounsky	Adenocarcinoma		x	x			
11	19 1	Ogorek	Adenocarcinoma		✓	x			
12	9 3	von Graff	Adenocarcinoma		✓	x			
13	19 3	Hess	Adenocarcinoma	x			x	Patient refused operation	4 years
14	9 3	von Hansenmann	Adenocarcinoma	x		x			
15	9 3	Frym	Adenocarcinoma		x	✓			8 years
16	19 3	Beuthin	Adenocarcinoma	x		x			
17	9 3	Beuthin	Adenocarcinoma	x		✓			
18	9 3	U terberger	Adenocarcinoma		x	x			
19	19 3 19 4	I. C. Rubi Ladinski	Adenocarcinoma		x	x			
20	9 4	Ladinski	Adenocarcinoma		✓?			O advice of geon whose cur- tage base quately showed no malignancy	year
21	19 4	Ladinski	Adenocarcinoma		x	x			
		Total				18	4		

carcinoma which was completely removed by the curette

In 1913 Stratz (16) reported the following case (This was probably the case mentioned by P Ruge)

Same case as 5 In the year 1886 C H Stratz made a microscopical diagnosis of carcinoma from scrapings from a patient curetted by Dr Schroeder Exploratory curettage had been done repeatedly at intervals of two years at the request of the patient because her mother had died of cancer It was the third or fourth time when he (Stratz) was asked to make the microscopic diagnosis the diagnosis of carcinoma was confirmed by Rüge, who at previous examinations had always found normal endometrium In view of these findings Schroeder did a vaginal hysterectomy and in spite of the most thorough examination no trace of cancer could be found in the extirpated uterus

In 1913 W Benthun (17) reported two cases and Unterberger one case before the Nord deutsche Gesellschaft für Gynäkologie at Königsberg

CASES 17 and 18 In Benthun's two cases the scrapings showed microscopically typical adenocarcinomatous tissue He then extirpated the uteri and could find no traces of malignancy

Unterberger (18) discussing the above cases mentioned a similar case which he had seen at the Rostock clinic

CASE 19 Case of chronic metritis with a small capsular myoma and a pea-sized mucous polypus in the fundus uteri

Histological examination of the uterine mucosa showed normal structure The base of the polypus was benign while the mucosa of the polypus was of typical carcinomatous tissue It was Unterberger's belief that if this patient had been curetted a diagnosis of carcinoma would undoubtedly have been made which on total extirpation of the uterus would not have been confirmed

PERSONAL CASES

My personal cases are three in number The first case came under my observation in April 1911 The patient was curetted at Beth Israel Hospital Curettings examined by Dr E Moschowitz showed adenocarcinoma On this finding a panhysterectomy was done on section the uterus showed a polyp about the size of a hickory nut at the base of the fundus Microscopical examination of sections from this polyp and of the uterus showed no evidence of carcinoma

I did not report this case then because I felt that one case might not prove sufficiently

convincing Moreover in a very excellent paper on The Early Diagnosis of Uterine Cancer with Especial Reference to Diagnostic Excision of Cervical Lesions Diagnostic Curettage and the Routine Microscopy of Curettings which was published in the *American Journal of Surgery* in November 1913 Dr I C Rubin reported this case both as an example of early diagnosis of uterine cancer as well as a case of complete removal of adenocarcinoma by curettage

CASE 1 I saw this patient F L in consultation in April 1911 because of profuse uterine hemorrhage and referred her to Beth Israel Hospital As this case was reported by Dr Rubin long before there was any question as to the correctness of the microscopical diagnosis of carcinoma in my second case I think it best to quote the history of and comments on the case as given by him which are as follows

The patient was 51 years old (the age was printed incorrectly in Dr Rubin's article) married 28 years has had four children Had been bleeding for a number of months She had been curetted several times but hemorrhage continued

On examination the uterus was large and soft there seemed to be a hard nodule near the fundus which could be made out by manual palpation The sound caused bleeding from the enlarged uterine cavity A preliminary curettage was done for diagnostic purposes On examination of the curettings it was found that there was a typical adenomaligium with early adenocarcinoma The glands were enormously enlarged and increased in number The hyperplasia was so marked that the glands lay *dos-a-dos* very little stroma if any, intervening There was papillary proliferation of the epithelium within the lumina and also an actual increase in the layers of cells which were atypical in appearance and showed mitosis On this finding a panhysterectomy modified after Wertheim was done

The uterus on section showed an elongated polyp about the size of a hickory nut with its base at the fundus It showed evidence of curettage Microscopic examination of this polyp and of the uterine mucosa showed however no area of carcinoma It was evident that all the lesions had been removed by the curette

Dr Rubin's comments on this case follow

The bleeding in this case was in all probability due to the submucous polyp and not to the very small area of carcinomatous conversion of the polyp

In this case carcinoma was clinically suspected and was corroborated by the diagnostic curettage The cause of the suspicion viz

hemorrhage was however the submucous polyp. The incipient carcinoma was merely grafted upon it and was altogether too young to give rise to the local and persistent hemorrhage. It was simply a coincidence which was revealed by careful routine and laboratory examination.

Curettage had been practiced several times but only once i.e. the last time was the material removed properly utilized by subjecting it to an examination for the benefit of the patient.

CASE 2. Mrs. D. B. 47 years old married 22 years had never conceived. She had men treated regularly every four weeks one to five days until two years ago when the men ceased for a whole year for the first year however she bled irregularly on and off there was no pain.

I saw the patient at my office for the first time on October 7, 1913. On examination I found the uterus somewhat larger than was to be expected in a woman who had never conceived and had begun the menopause two years ago. A small bleeding mucous polyp protruded from the os which I snipped off and which on microscopical examination proved to be benign. I gave a very good prognosis and requested her to report at my office every four to six days.

As the bleeding continued for five weeks after the removal of the polypus I advised a curettage which I did at Beth Israel Hospital on November 14, 1913. The scrapings consisted of shreds and several pieces of tissue the size of peas. Dr. F. H. Moschowitz the pathologist, reported a few days later that the scrapings showed adenocarcinoma. I then informed the patient's husband of the finding of malignant disease by the pathologist and I advised an immediate hysterectomy. He decided to wait a while and removed his wife from the hospital a day or so later at the request of her family. I wrote a letter to Dr. H. C. Coe in which I gave her history and the microscopical findings and requested his opinion. Dr. Coe's examination revealed a uterus somewhat enlarged and the os protruding, and taking into consideration the suspicious history together with the pathological finding of the scrapings concurred with me as to the necessity for hysterectomy. I learned this subsequently from Dr. Coe as the patient did not return to me with his answer. A few days later she consulted another surgeon who gave his opinion as the result of his first vaginal examination and before doing an exploratory curettage that she did not require a hysterectomy and that she never did have cancer. However a curettage performed by this surgeon on December 6 showed no signs of cancer on microscopic examination by competent pathologists.

After he was assured by Dr. Moschowitz that the specimen examined by him was undoubtedly adeno-

carcinoma and was positively removed from this patient as proved by the statements of the assistant pathological members of the house staff and the technician of the laboratory of Beth Israel Hospital all of whom were concerned in handling this specimen he agreed to curette the patient and the microscopic examination of the scrapings showed no trace of malignancy.

In this second case the growth was in all probability originally a polyp which had undergone malignant degeneration. A benign polyp was demonstrated clinically before the operation and the size of the curettings appeared to confirm a polypoid growth. The pedicle and adjacent portion of the uterus were evidently not involved. Whether the tumor was an ordinary adenomatous polyp that had undergone carcinomatous degeneration or a primary adenocarcinoma that had assumed a polypoid shape cannot be determined.

CASE 3. L. L. age 63 years, married 44 years. Has had twelve children the last twenty four years ago. Menopause 12 years. Consulted me because of uterine hemorrhages for the past ten weeks.

Vaginal examination showed uterus enlarged as usual. Exploration of the cervical canal with finger revealed a uterine polyp with the pedicle apparently attached close to the fundus. Patient was admitted to Beth Israel Hospital on May 29, 1914. Under ether anesthesia the cervix was dilated and an attempt was made to excise the polyp but owing to its extreme friability this was impossible and its removal was effected piecemeal by means of the curette. About fifty or sixty irregular masses varying in size from peas to hickory nuts were removed. Microscopical examination of sections of various masses showed necrotic adenocarcinoma, the tissue showing a combination of the solid and a leucocarcinoma. Upon this finding an abdominal panhysterectomy was done on June 3, 1914.

The extirpated uterus showed macroscopically apparently healthy endometrium and on the posterior wall near the fundus was still attached a small pedicle the size of a hazelnut. Microscopical examination of sections made of the pedicle as well as of other parts of the uterus showed no traces of adenocarcinoma.

In connection with this case the following letter from Dr. Cullen is of interest.

I have just finished reading your very interesting paper on Complete Removal of Early Carcinoma of the Uterus by Exploratory Curettage. The historical résumé you have given is a most instructive one. The men who have made reports

are so well known that what they say naturally carries much weight. Your case Lubman (Case 3) is a most convincing one and even if there had been no literature on the subject before would have proved conclusively that the curette may in rare instances entirely remove a cancer.

I think that the meager literature on the subject clearly indicates that the possibility of complete removal of carcinoma by the curette is a great rarity. You are thoroughly familiar with the fact that in many of the European clinics careful examination is made of all the material and had such cases occurred more frequently they certainly would have been published. In our conversation when you were here we referred to the routine examinations we have made at Hopkins. The Gynecological Laboratory came under my care in 1893 and from that date until the present every piece of tissue from the operating room has been carefully and systematically examined. During that period of twenty-one years we have never had a case analogous to the ones under discussion. In other words, thus far in every case where we diagnosed carcinoma from scrapings we have later been able to find macroscopically evidences of cancer in the body of the uterus when the organ had been removed. If this condition were a common one then we certainly should have had several examples in a period of over twenty-one years.

PATHOLOGICAL REPORTS

BY ELI MOSCOWITZ M.D. NEW YORK

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CASE 1. Specimen consists of uterus, right ovary and tube and small portion of left tube and left ovary. Uterus is 9 1/2 cm long and 6 cm in width at its greatest diameter. The peritoneal surface is smooth and near the junction of the left tube is a small pedunculated fibromyoma about the size of a hazelnut.

On opening the uterus anteriorly the fundus is occupied by a pedunculated mass which fills the entire upper portion of the uterine cavity its tip extending to 1 cm above the internal os. The base of this mass is broad and attached to the entire circumference of the fundus. The surface of the mass is smooth its consistency soft and its color pale red. The mucosa of the uterus is smooth throughout. The cervix presents a few cystic erosions but is otherwise normal.

The right tube presents no gross abnormality. The right ovary is normal in size and is deeply scarred.

Macroscopic examination of curette. Curettings from the uterus removed by Dr. Ladinski in April 1911 revealed the following. The slide made from these curettings consists largely of blood and fibrin in which are embedded small and larger particles of tissue of glandular type. Some of these show uterine glands that are obviously normal the greater number however show glands that are extremely convoluted. In some areas these con-

volutations are so prominent as to resemble a papilloma in appearance. The majority of these adenomatous spaces are large and their lumina are occasionally filled with blood and fibrin. The epithelial cells are irregularly arranged and consist of two or more layers the nuclei are vesicular rich in chromatin and are irregular both in size and shape. Mitotic figures are few and easily demonstrable. The penetration of the epithelium through the membrana propria is easily recognizable. In some situations the lumina are so nearly filled with the exuberant epithelium as to resemble a carcinoma of the solid variety. The stroma between the adenomatous spaces is very thin and in some places nearly absent so that the epithelial cells of adjacent glands seem to be in contact.

Diagnosis. Adenocarcinoma of the uterus.

Microscopic examination of the uterus and polyp. Sections were taken from the tip of the polyp, the curetted area described above the base of the polyp and from a number of areas in the uterine wall. Sections from the polyp show throughout a uniform appearance both at the base and at the tip. The polyp is of the conventional adenomatous type containing small and larger glands of uterine type lined by a single layer of regularly arranged low cuboidal cells. Some of the glands are slightly convoluted but there is no sign of reduplication or atypicism of epithelium.

The stroma is very abundant and consists of smooth muscle fibers containing a small amount of fibrous tissue and small blood vessels.

The curetted area near the tip of the polyp was especially carefully examined but with the exception of a hemorrhagic stroma due to the trauma of the curettage there was not the slightest suspicion of any tissue resembling the curetted material.

Diagnosis. Pedunculated adenomyoma of the uterus.

CASE 2. From the material removed by curetting two slides were prepared. The first reveals two fair sized masses each about 1 cm in diameter and a few smaller shreds with some blood and fibrin. The larger masses consist of glandular spaces which are very irregular in size and conformation. These glandular spaces are lined by two or more layers of epithelium which vary in shape from low cuboidal to high cylindrical. In many of the more closely packed spaces the cells are polyhedral. The epithelial cells vary greatly in size the nuclei are also irregular in size and shape. They are irregularly situated vesicular fairly rich in chromatin and show few mitotic figures. The membrana propria of these adenomatous spaces are invaded so that adjacent spaces communicate. In places the epithelial cells completely fill alveoli which are irregular in size and contour. The stroma is abundant and consists of fibrous tissue infiltrated with many round cells and in many places distinct muscular fibers are visible. The smaller shreds of tissue in this specimen reveal structures identical with those described.

The second slide reveals about one half dozen small masses each varying about the size of a millet seed. Some of these masses show solid nests of epithelial cells similar to those above described embedded in a stroma resembling the stroma of the uterine mucosa. The others show nests of the uterine type.

Diagnosis: Adenocarcinoma of the uterus.
Case 3: Specimen consists of uterus and both fallopian ovaries. The uterus is 11 cm long and 3.5 cm at its greatest diameter. The peritoneal surface is smooth. On opening the uterus anteriorly the cavity is found flattened measuring 3.5 cm longitudinally and 3 cm at its greatest diameter. The rim of the uterus is pale red and perfectly smooth. Attached to the posterior wall of the cavity about 1.5 cm from the fundus and a little to the right of the median line is a small pedicle 1.5 cm long which attached to the uterus is a narrow pedicle about 1 cm in diameter. The tip is slightly bluish, it is much hemorrhagic and presents a traumatized surface. The uterine wall averages 1 cm in thickness is firm and presents no gross abnormalities. The fallopian tubes are normal. The ovaries are normal in size and consist of a few scattered.

Macroscopic examination of the uterus: The cut surface of the uterus is about 11 cm in diameter, the surface is smooth, the uterus is split open. All the masses are hard and firm. The pedicle is a type of firm, the masses are composed of solid adenocarcinoma. The carcinomatous alveoli are small, the glands which line these alveoli are irregular and complete with thick rim are large, polyhedral and vary much in size and shape. The nuclei are large, vesicular, vary greatly in size, are very rich in chromatin. The stroma is pale and consists of delicate strands of tissue, is edematous in many places. The vessels and the rim are a few muscular fibers. The rim is a fairly rich blood vessel. The rim extends necrosis. Some sections show the necrosis in the focal areas, the sections are completely necrotic so that only a few tumor tissue staining intensely with eosin are visible.

Some of the sections indicate the polypoid nature of the rim is by a covering flow cut in depth upon the surface.

Microscopic examination of the pedicle: Some of the sections reveal the tip of the pedicle and from its base.

The section from the tip shows an intense hemorrhagic and partially necrotic area of tissue in which may be recognized small nests of epithelial cells preserved by vascular connective tissue and a large number of markedly dilated blood vessels. Along the borders of the tip there is a thin stratum.

Section from the base shows a fibromuscular structure in which are embedded a fair number of glands of normal uterine type. The connective-

tive tissue of the stroma are considerably swollen resembling a critical reaction. There is not the slightest evidence of carcinoma in any of the sections removed from this pedicle.

Section removed from the wall of the uterus power shows entire absence of a mucosa. The mucosa has been invaginated into the tissue resembling granulation tissue containing a large number of small young blood vessels and an occasional uterine gland.

Diagnosis: Adenomyoma.

The muscular coat of the uterus shows a moderate amount of atrophy. The blood vessels show a moderate degeneration.

BY DR. JAMES M. G. M.D. NEW YORK

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Case 4: Section 1 (6). The material consists of many fragments of curettings. The structure presents two main features: (1) Compact groups of distinctly typical hyperplastic endometrial glands and (2) compact small groups of large open polygonal epithelium which lie in the stroma between the glands.

The former resembles the ordinary adenoma derivatives of the follicles. The latter appears to arise from infiltration of the stroma by low papillary projections dipping down from the surface epithelium. In effect this case is an early adenocarcinoma of the uterus.

Case 5: Section 2 (3). The section shows a pedunculated uterine polypoid mass with a segment of uterine muscle attached to one extremity. The polypoid mass shows a fibroepithelial growth with slight admixture of muscle cells. The glands are hyperplastic, lumina dilated and lined by cells of epithelial type. There are no features of malignancy in the pieces.

Case 6: Section 3 (10). The material appears to consist of settled fragments of uterine mucosa, situated in the myometrium as a small granular mass. The structure of the tumor varies. There are many large groups of cylindrical and cuticular areas and a few small foci of some of which are well defined. This is a typical appearance of a leiomyoma of the fundus. Other portions of the material are more compact and are composed of small large cells of squamous type or compact spindle cells or occasionally cuboidal. They are arranged in large convoluted masses with narrow irregular spaces. This portion may be designated as an adenocarcinoma, probably originating in the fundus.

The case is therefore an adenocarcinoma of the fundus.

Case 7: Section 4 (35). Section shows a well circumscribed area of tumor tissue which is composed of very small irregular alveoli some with lumina and some without lumina while some small groups of cells fail to exhibit an irregular arrangement and are growing diffusely. The stroma is vascular and is undergoing mucous degeneration.

CASE 3 Sections 4, 663 from the pedicle are composed of vascular inflamed fibromuscular tissue in which are groups of swollen clear endothelium but no portions of tumor tissue

CASE 3 Sections from the uterine mucosa near the base of the polyp show almost complete atrophy of mucous glands and stroma of mucosa. There is marked hyaline thickening about many vessels in the endometrium. Signs of a tumor process are absent. Section taken from the base of the pedicle shows inflamed muscular tissue of the uterus infiltrated with blood. A few low polypoid projections are visible covered by one layer of slightly atypical epithelium. The stroma contains foci of large polyhedral hydropic cells probably endothelium. Signs of a tumor process are missing in the pedicle.

This case is one of atypical adenocarcinoma of the endometrium. The peculiar structure suggests an origin from misplaced embryonal tissue.

BY FRANCIS CARTER WOOD M.D. NEW YORK

Department of Cancer Research, Crocker Laboratory, Columbia University

CASE 1 Sections from curettings. Section 1 562. No 1 shows an adenocarcinoma of the uterus evidently some curettings. Section No 2 shows the same.

CASE 1 Section from polyp. Section 1 591. No 4 shows what I take to be a polyp of the uterus with a glandular hyperplasia and a fibrous stroma.

CASE 2 Sections from curettings. Section 4 398. No 1 shows a solid carcinoma presumably from the uterus as there are remnants of cervical glands in the specimen. No 2 shows much the same picture. There are some solid and some glandular alveoli and a tendency to alteration to squamous cell epithelium in some of the areas.

CASE 3 Sections from curettings. Section 4 955. No 1 shows an adenocarcinoma of a fairly solid type with some production of mucus. No 2 shows much the same picture.

CASE 3 Section from base of polyp. Section 4 663. No 5 shows fibrous tissue invaded by glands which in some places are of the type of uterine glands and in others are high cylindrical contain mucus and look like cervical gland.

CASE 3 Section from base of polyp. There are several small areas with discrete spherical cells slightly suggestive of infiltrating carcinoma. Other areas show large fatty or degenerated cells looking like those of xanthoma. I should judge that the latter are altered connective tissue cells the peculiar appearance being due solely to the inflammatory conditions in the tissues.

CASE 3 Section from top of polyp. Section 4 663. No 7 shows only a very small amount of highly vascularized connective tissue and blood clot. There is no evidence of carcinoma.

BY W. G. MACCALLUM M.D. NEW YORK

Pathologist, College of Physicians and Surgeons, Columbia University

CASE 1 In general I think that it may be difficult to arrive at an absolute diagnosis of the existence of an

adenocarcinoma in curettings from a polyp of the uterus in some cases as for example the first case (No 1 562) since there the fragments of tissue are very small and look somewhat crushed. It is true that the glands are very complex in form and in some places one receives the impression that their lumina are partly or completely filled with epithelium but that may in places be inflamed as the effect of a tangential section. I do not think much stress can be laid upon their proximity to one another and I was not able to find unquestionable examples of the loss of a definite gland line outline. On the other hand in one section the surface of the polypoid tumor can be traced for some distance very clearly as a frill line covering of high columnar epithelium and this covering overlies the very tissue in which the most complex glands are found a condition which one finds in a polyp but hardly I should think in a carcinoma. Nevertheless it is quite conceivable that carcinomatous changes might be found in the depths of a polyp whose surface was still intact.

In the sections from the uterus (1 591) and the polyp as it lay in the uterus I saw nothing even suggesting a malignant growth and it is very clear that the glandular structures in those sections are not nearly as complicated as those in the curettings.

CASE 2 In the second case (1 598) which was represented by two slides of sections from curettings and in which the uterus had not been extirpated there is one mass which seems to me an undoubted carcinoma with irregular anastomosing rounded and hollow masses of epithelium. The atypical appearance of the cells and their relation to the musculature and connective tissue leaves no doubt I think as to their malignant mode of growth. Some parts of this tissue look rather like atypical squamous epithelium. But the other fragments of tissue on the same slide and all those on the other slide are of a quite different sort — there are contorted glands with clear sharp outline and masses of normal squamous epithelium such as might come from somewhere near the uterine os. Of course it is possible that they might come from an affected and an unaffected part of the uterus and I take it for granted that the possibility has been excluded that curettings from two cases might have been mixed.

CASE 3 The third case (4 955 and 4 956) presents an extraordinary mass of curetted material and while several of the sections show chiefly blood clot with a little connective tissue and blood vessel with occasional remnants of epithelium one section shows a tumor of very compact arrangement in which solid strands of cells rarely with a distinct lumina are closely packed in a connective tissue stroma. The cells have not the ordinary character of uterine epithelium but are extremely atypical often with peculiar round red staining inclusions which may be dead and altered cells. I should think there is no question of the malignant anatomical type of this tumor although it does not resemble very closely the usual adenocarcinoma.

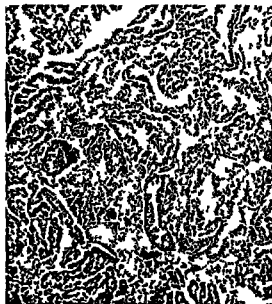


Fig. Case 1 (56) Section of curettings showing typical adenocarcinoma

In the sections from the uterus and from the pedunculated hemorrhagic mass in the fundus I could find nothing remotely resembling a carcinoma. In this case the great quantity of tissue removed by the curette makes this latter finding especially interesting. Of course one can easily imagine that an adenocarcinoma which must have a local beginning might be accidentally completely removed by a curetting in this early stage and when one remembers the relatively slight malignancy and slow invasiveness of these tumors in many cases it is easier to believe that such interference might be successful in removing all the tumor. It is harder to understand in case 4055 in which such great quantities of tissue were removed. On the whole I see no reason why such incipient tumors might not be happily and completely removed in this way although the chances of hitting upon this incipient stage must be rare.

I think however that it would be exceedingly unfortunate if the idea were spread abroad that carcinoma of the uterus is even occasionally curable by mere curetting since this would undoubtedly be seized by the lay sufferer in her efforts to escape operation and might go far to annul the work of those who are advocating early operation.

BY F. M. JEFFRIES, M.D., NEW YORK

Pathologist, New York Polyclinic Medical School and Hospital

The microscopical sections you have submitted to me for examination have been carefully studied with the following findings:

CASE 1: Sections from curettings. Two slides, adenocarcinoma. Section from polyp. No evidence of neoplasm — a hypertrophic endometritis.

CASE 2: Sections from curettings. Both slides contain carcinoma, probably squamous, called

CASE 3: Sections from curettings. Majority of slides contain adenocarcinoma. Sections from polyp. No evidence of neoplasm.

I have read your paper and must admit that one can conceive the possibility of the complete removal of an adenocarcinoma of the uterus by curetting if it happens to be at an early stage of development and the curetting is thoroughly done. Or it might also be accomplished in cases where the neoplasm originates on a polyp, but the chances for such happy results are exceedingly slight and I would deem it unwise to allow development of the idea that cures in such cases are thus obtained.

BY ISAAC LEVIN, M.D., NEW YORK

Chief, Cancer Research, Montefiore Hospital

CASE. The gross specimen of the first case presents a polyp at the fundus of the uterus. The microscopical specimens obtained from the scrapings show the condition of adenoma with a distinct beginning of invasive growth and malignancy. The microscopical specimens obtained from the extirpated uterus show no malignancy.

CASES 2 AND 3. The microscopical specimens obtained from the scrapings of the second and third case show a condition of adenocarcinoma.

CASE 3. The gross specimen of the third case shows a normal uterus with the remaining pedicle of a polyp at the fundus. The microscopical specimens obtained from the extirpated uterus show no malignancy.

SUMMARY OF COLLECTED CASES

Including my three cases we have a record of twenty-two cases (all of which were carcinoma of the body of the uterus) where the disease was removed *in toto* by the curette. Of these nine and if we include my second case ten were instances of carcinoma at degeneration of uterine polypi and in the remainder the growth developed in the uterine mucosa. In nineteen cases extirpation of the uterus was practiced while in four cases the curettage was not followed by a radical operation in two because the patients refused the operation in one the attempted extirpation was not completed on account of hemorrhage and in the fourth because the surgeon advised against it. The patients in whom no extirpation was done remained well from one to four years.

In all the cases cited the prominence of



Fig 2 Case (59) Uterus cut anteriorly showing polyp attached to the fundus. Sections from this polyp and various places in the wall of the uterus show no carcinoma.

the authors who made the studies and reports precludes any possibility of a mistake in diagnosis or a mix up in the slides.

As regards my own cases the appended reports of the distinguished pathologists leave no room for doubt as to the accuracy of the diagnoses.

In the second case a most thorough and searching investigation instituted by Dr Eli Moschowitz pathologist as to the handling of this particular specimen proved beyond any question that there was no mix up in the specimen or in the slides. Moreover no specimen of carcinomatous curettings was submitted to the laboratory for examination from any source whatever either at that time or for a number of months previous to the presentation of this specimen so that a mix up of slide was a physical impossibility.

As to the theory that the scrapings could not come from the same uterus because the one submitted by me showed evidence of advanced carcinoma that has been definitely eliminated by Dr Moschowitz as well as by Schottlander (19) and the pathologists who studied the specimen and if additional proof were necessary the incontrovertible evidence I found in my third case six months later where the curetted polypus showed carcinoma far advanced while sections from the uterus and pedicle showed absolutely no traces of malignancy.



Fig 3 Case (59) Section from the polyp showing typical adenoma.

That a carcinomatous growth can be totally removed by the curette when it is limited to a uterine polyp or when it is confined to the mucosa is proved beyond any question of doubt by the cases cited above. Moreover Schottlander (19) holds that a young carcinoma can also be removed by the curette when there is penetration into the muscular wall.

REASONS FOR SCARCITY OF RECORDS IN THE LITERATURE

In view of the prevalence of adenocarcinoma of the uterus it is indeed remarkable that so comparatively few cases are on record of the removal of the growth by exploratory curettage. It is worthy of note that the cases reported thus far are found in foreign literature. The first case was reported about thirty years ago. A thorough search of the American and English literature does not reveal a single record of a case (with the exception of Dr I. C. Rubin's report of my first case).

One reason for the failure to report these cases may be found in the fact that when a



Fig. 4. Case 2 (4397). Section of curettage. Adenocarcinoma (low power) of the uterus. Solid carcinoma below.

subsequent curettage does not confirm the finding of carcinoma at the first curettage or if the patient continue well for an indefinite time after curettage has shown adenocarcinoma the circumstance; as a rule attributed to a mistaken diagnosis and as a result the reports of such cases do not find their way in print. In fact I personally have heard of several instances where a diagnosis made under such circumstances was accepted as a mistake without further question and judging from the expressions on this point by nearly all of the writers I have quoted above a similar experience is not so very rare among surgeons. Lassarner especially made it a point to interview gynecologists and pathologists on this subject and as a result concluded that such cases are not at all uncommon.

The number of cases of carcinoma of the uterus seen by me in private and hospital practice as compared with my other material is so exceedingly small that the above report of three cases is another proof that other surgeons who see more cases of cancer of the

uterus than I do must necessarily have had similar experiences.

Another reason for the apparent scarcity of reports of these cases and which I hope will be brought home to American Surgeons is that diagnostic exploratory curettage is not resorted to as often as it is indicated and that the routine microscopical examination of curettages is not practiced to the extent that it should be. Otherwise cases of early adenocarcinoma of the uterus when the disease is still limited to the mucosa would be recognized more frequently and the possibility of its complete removal by means of the curette would be a matter of general knowledge. This is especially true in America for it is inconceivable that of the tremendous number of patients suffering from adenocarcinoma there is not a single record of a similar report in this country.

VALUE OF DIAGNOSTIC CURETTAGE IN ADENOCARCINOMA OF THE BODY OF THE UTERUS

That three such comparatively rare cases should come under my observation and especially a two of them were discovered within the short interval of six months, may be one of those peculiar incidents met with in practice but I cannot help believing that the diagnosis of adenocarcinoma in these cases was to a certain extent due to my practice of curetting every case giving the slightest suspicious history and to the system in vogue at Beth Israel Hospital that all curettages are invariably examined microscopically as a routine procedure.

Schottlander urges preliminary curettage even in a myomatous uterus on account of the not infrequent incident of cancer and because a failure to do so may occasionally be followed by the development of cancer in the stump of the cervix after supravaginal hysterectomy. My experience in one case proved pretty conclusively that because a preliminary exploratory curettage was not practiced an early adenocarcinoma of the uterus was overlooked.

In September of 1911 I had occasion to operate upon a patient who had had performed by another surgeon few months previously supravaginal hysterectomy done for supposed fibroid. I found

adenocarcinoma of the stump of the cervix about the size of a child's head which could not be removed. A diagnostic curettage preliminary to the supravaginal hysterectomy would have discovered that she was suffering from adenocarcinoma. This patient is still alive after four and one half years with a pelvis full of carcinomatous masses but the disease seems to have been held in check by X-ray treatment administered by Dr Samuel Stern since the exploratory laparotomy (four years ago).

There are no better and safer means at our disposal to detect the disease in its incipency than exploratory curettage and routine microscopic examination. Women should be impressed with the fact that any variation from the normal especially in regard to the menstrual function particularly when they have reached the climacteric (although no age is exempt from uterine cancer) should be regarded as suspicious and calls for an exploratory curettage and microscopic examination.

The address of Carstens (20) before the recent meeting of the American Association of Obstetricians and Gynecologists on the necessity of constantly watching for cancer of the uterus by routine examination of all curettages no matter for what condition the curettage is done is timely and should find its echo in every nook and corner of this land.

The prognosis is best for cancer of the body of the uterus when diagnostic curettage is done as early in the disease as possible and the surest way to find adenocarcinoma in its earliest stage is to be in constant watch for it by microscopy of curetted material.

It must also be borne in mind that while no absolute reliance can be placed on palpation of the uterus and exploration of its cavity in the diagnosis of early adenocarcinoma of the body of the uterus the subjective and objective symptoms however are of the utmost importance not infrequently they are of greater diagnostic value than exploratory curettage which may at times fail to detect an early carcinoma.

Burchhardt (21) reports four cases when a most thorough curettage revealed no cancer on microscopic examination but owing to the suspicious subjective and objective symptoms extirpation of the uterus was practiced in all



Fig 3 Case 3 (4955) Polypoid mass removed by the curettage 11 of which show adenocarcinoma

The extirpated uteri showed in each case small carcinomatous area in the angles of the tubes which escaped the curette.

Semon (22) reports a case where a very early carcinoma was situated behind a submucous fibroid and could not be reached in a thorough preliminary curettage.

Duhrssen (23) reports a case in which the first several scrapings showed histologically benign endometritis glandularis but later on in addition to this picture showed typical cancer formation. In this case extirpation of the uterus was done.

CAN UTERINE CARCINOMA BE CURED BY CURETTAGE

Can the complete removal of adenocarcinoma by the curette without extirpation of the uterus be regarded as an adequately radical measure? This question I am convinced is one surgeons will be called upon to answer more frequently in the future than they have in the past. Does not the experience of the

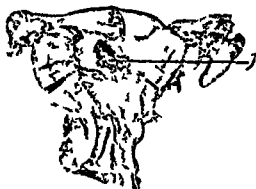


Fig. 6 Case 3 (4963) Uterus and pedicle of polypoid sections from back wall of denocarcinoma. Uterus opened anteriorly showing tumor on pedicle after removal of large adenocarcinomatous polyp. Sections from this pedicle and through anovous portion of the ligament of uterus show no carcinoma.

cases cited above teach us that one positive microscopical diagnosis is worth more than all the negative findings, providing of course every care has been taken in the process of establishing the pathological diagnosis and that to extirpate the uterus even if a subsequent curettage does not reveal carcinoma will serve the best interests of the patient?

Both Vassmer and Hess speak of their cases as permanently cured because both their patients were free from recurrence for four years. In their cases extirpation of the uterus could not be done in the first because the patient refused an operation in the second owing to an accident during the attempt at extirpation.

The freedom from recurrence clinically speaking for four or five years presents a strong presumption but no positive assurance that a permanent cure has been effected. I am fully in accord with von Hansemann (14) who maintains that the mere removal of the diseased area does not effect a permanent cure. Even the removal of the diseased area in its incipiency by the curette when supplemented by extirpation of the uterus does not protect against a possible recurrence. This is evidenced by the very rapid recurrence in the case of Schroeder reported above by Rüge and Stratz. On the contrary the chance of



Fig. 7 Case 3 (4955) Section of curettage. Microscopic section of typical curettage showing nests of solid and adenocarcinoma. In the lower portion of the field are some smooth muscle fibers.

recurrence is greater when the uterus is left in since in that case the possibility is always present of a fresh malignant degeneration of its mucosa.

PROGNOSIS

The prognosis in uterine cancer is always exceedingly doubtful owing to the extreme uncertainty and indefiniteness of the course duration and manifestation of the disease. While the German statistics show in carcinoma of the uterus a ratio of operability of 45 per cent to 60 per cent and absolute curability of more than 5 years duration in 20 per cent the ratio of operability in England as shown by Wilson (24) of Birmingham is only 30 per cent to 40 per cent with absolute curability of 10 per cent. Wilson attributes the low ratio of operability and curability to the same causes we find here in America, viz that the lay public and the general medical profession do not as yet realize that cancer is curable by radical operation in the early stage.

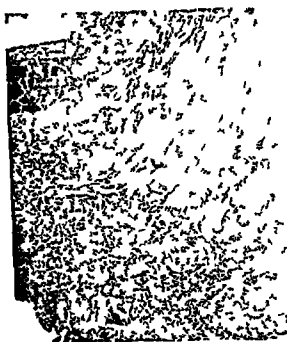


Fig 8 Case 3 (4963) Section from top of pedicle showing hemorrhagic and partly necrotic tissue with dilated blood vessels but no carcinoma



Fig 9 Case 3 (4963) Section of base of pedicle showing gland of the normal uterine type imbedded in smooth muscle tissue and leiomyoma

When exploratory curettage becomes the rule of practice rather than the exception and when microscopic examination of all curettings becomes a matter of routine carcinoma of uterus will be diagnosed at an early stage and not when 70 per cent of the cases are inoperable with early diagnosis the chances for permanent cure will surely be enhanced.

In cancer of the body of the uterus however the percentage of absolute curability is from 24 per cent as given by Wilson in his own series to 50 per cent as usually claimed.

The fact that the ratio of curability of carcinoma of the body of the uterus is far better than in that of the cervix is no excuse why we should rest content with the removal of the diseased area in carcinoma of the body when nothing short of a most radical extirpation is accepted as sufficient in the case of carcinoma of the cervix. Ordinary surgical principles demand that a carcinoma be removed with a wide field as possible from the disease and it would be contrary to all surgical rule to leave in a uterus the seat of

carcinoma even if the curette has entirely removed the diseased portion.

In view of the present active and praiseworthy propaganda to familiarize the profession and the laity with the extreme importance of the early recognition of cancer of the uterus the presentation of these cases is most opportune. It proves the tremendous advantage to be gained in attacking the disease in its incipency and also serves as a serious warning that cannot be too strongly emphasized on the medical profession as well as among the laity that extirpation by the curette of a young cancer is no cure but on the contrary a positive indication for the radical operation. Moreover it might be well to point out a danger that von Hensemann emphasized when he said: "If the lay people would be led to believe by the report of these cases that curettage is sufficient to cure a carcinoma uterus they would therefore decline the major operation. If this opinion should become more general



Fig. Case 3 (4963). Section of uterus. Section from mucosa of uterus shows normal uterine glands unembedded in fibrous stroma.

great injury would be done because if among the thousands of sufferers from carcinoma uteri there are three in which all traces of carcinoma are removed by the curette it does not affect the necessity of total extirpation. This operation remains the only necessary treatment when the exploratory curettage reveals carcinoma.

The cancer problem will be solved only when the nature and etiology of the disease are discovered and the research work that is being carried out with that end in view gives us hope and encouragement that this most important problem will eventually be solved.

Meanwhile the only means at our disposal with which we can attack the disease and limit its ravages and mortality is first the perfecting of the radical operation and second devising ways and means by which the disease in its incipency can be suspected by the laity and recognized by the profession. The scope of operative procedure seems to have reached its limit so that in a practical way

our efforts and energies for the present can be directed only toward the question of early diagnosis and the education of the laity to a realization of the fact that the only hope of effecting a cure rests in the earliest possible diagnosis and the earliest and most radical operation.

CAN CANCER OF THE BODY OF THE UTERUS BE CURED SPONTANEOUSLY

The only other possible explanation of the disappearance of the evidence of malignancy after curettage to be considered is the theory of spontaneous cure. Vassmer and Hess raise that question in connection with their cases. They cite hundreds of cases of spontaneous cures that have been reported in the literature. Usually when the word spontaneous cure is used therapeutic means were employed such as various chemical irritants, the X-ray, etc. It has occasionally happened when a portion of a malignant growth has been removed the remaining neoplasm has undergone retrogressive changes. It was shown by Bier Lomer and Theilhaber (25) that an increased blood supply will cause regression in the cancer and that hemorrhage will stimulate the hematopoietic organs giving a richer fresh blood supply. Therefore Hess thinks that the free bleeding during the process of curettage has a lytic effect on the cancer-cells that have escaped the curette. It is known that cancer antibodies circulate in the blood and to a certain extent tend to prevent the progress of the disease. It is conceivable that in early cases of carcinoma the entire cancer antibody system has not yet been destroyed and therefore the excision of a portion of the tumor will render it possible for the remaining cancer antibodies to cause a destruction of those cancer rests that have not been removed.

However spontaneous cure from a scientific standpoint has not yet been proved. Theilhaber appears to be the only author who is a firm believer in the theory of spontaneous cure. Von Hansemann on the other hand considers the spontaneous cure of carcinoma of the uterus as a medical superstition.

The only malignant tumor of which we have a positive record of a spontaneous cure

1 chorion epithelioma and the case of chorion epithelioma reported by me in 1902 which by the way was the first case reported in the literature which was clinically suspected and microscopically diagnosed from the curettings before extirpation showed distinct signs of metastatic pulmonary emboli as evidenced by the physical signs and hæmoptysis these symptoms disappeared spontaneously and the patient remained well for more than ten years

Hes. also considers the question of the latent state of malignancy as presented by Brettschneider (26) and while we cannot endorse Dr Brettschneider's theory there is a great deal of truth in his conclusion which is embodied in the following quotation

Though we are justified in drawing certain conclusions in regard to the prognosis of carcinoma from the histological and anatomical conditions and from the age of the patient we must always remember that there are other things as yet unknown, that may influence the prognosis and we must always bear this in mind when treating inoperable carcinoma so that such cases may not fall into the hands of quacks enabling them to get credit which they do not deserve

And I desire to add that to a certain extent the same is true of operable cancer and we are therefore in duty bound to protect the profession and the laity against the individual who is consulted by a patient in whom the evidence of carcinoma of the uterus has been removed by a diagnostic curettage and makes use of that fact for the purpose of exploiting his ability to cure carcinoma without a radical operation

In conclusion I beg to acknowledge my sincere gratitude to Dr Eli Moschowitz for the elaborate and painstaking histological and pathological descriptions of the specimens and sections of my cases and for the efficient system he has established in the laboratory of Beth Israel Hospital without which the above report would not have been possible I also desire to express my sincere thanks to

Dr James Ewing Dr W G MacCallum Dr Francis Carter Wood Dr F M Jeffries Dr Isaac Levin and to Dr I C Rubin for their kindness and courtesy in making pathological studies of my cases and furnishing me with the appended admirable reports

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SOME RARE FETAL TERATISMS WITH ILLUSTRATIVE CASES— SYMPODIA CRANIOPAGUS AND ACEPHALUS

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1909

THE specimens I wish to present exemplify the danger to which gemellar pregnancies are subject. It is not my intention at this time to enter into a discussion of the various theories which have been advanced in explanation of the evolution of teratic anomalies such as fetal inclusion, the occurrence of foeto-amniotic band, and the intricate anastomoses and reversals of current in the foeto-placental circulation. In these cases of multiple pregnancies, the struggle for existence begins at a very early stage of intra-uterine life, and the law of the survival of the fittest adduces no more striking illustrations than the remarkable instances of *fatus pipyraeus* and the other well known cases of anomalous fetal development occurring in association with normal embryonic growth. It was my good fortune to have recently acquired for my teratologic collection a number of the rarer teratic conditions three of which I bring before you now.

1. SYMMELIA (SAINT HILAIRE) OR SYMPODIA (BALLANTYNE)

The first of these is a remarkable example of the condition described by Geoffroy Saint Hilaire as *symmelia* and by Ballantyne as *sympodia* occurring in a twin birth which was brought to me through the courtesy of Dr. A. L. Cammagg. The labor was a normal one in so far as a twin birth may be termed normal. One *fatus* was born alive and to all appearance normal in every respect. The twin was the *symmelic* monster (Fig. 1).

Saint Hilaire divides this group of monsters into three distinct varieties of which the first is *sirenomelia* or *sympus apus* (Forster) mermaid like creatures in which the lower portion of the trunk tapers off into a point without any pedal extremity and with only rudimentary ankle-bones. This is the most common variety. The second group *uromelia* or *sympu monopu* (Forster) of

which my monster is a fine specimen has prevented the ankle bones and the extremity terminates in a single foot. This is the rarest of the varieties. The third group *symmelia* or *sympu dipu* (Forster) presents two more or less distinct feet.

Symmelic monsters are characterized by imperfect development of the pelvis and lower extremities by *atresia ani et urethrae* by more or less intimate fusion of the lower extremities and by a twisting of the lower limb so that the femora are united by the external condyles the leg by the tibiae and the feet if they exist by the fibular edge and little toes so that the heels look forward (Hirst and Hirsch). In the case of a *uromelic* monster such a specimen the fusion of the limbs is more complete and there is but a single foot. The thigh usually shows evidence of double formation but the leg is single. The foot may be normally formed imperfect or may possess six to eight toes. In the latter case the big toe is always in the middle and the heel in all forms is turned forward (Hirst and Hirsch).

In most of the cases of *sympodia* no trace of the kidneys or bladder can be found in most of them the external genitalia are absent and there is generally an absence of the anus and rectum although there may be a very small indentation in the outer skin to represent the anus. However Julliard reported a specimen having a perforate rectum and rudimentary external genitalia while Cichorius' case had a urogenital sinus and an external orifice for the urinary passages. In my specimen the external genitalia are absent also the anal orifice. The *fatus* has not been examined anatomically therefore no report can be made of the internal findings.

Gladstone speaking of the causation of *symmelia* state that the condition appears

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to be due to a fusion of the post axial borders of the limb buds over the cloacal area and the outward rotation of the limbs appears to be partly caused by the prevention of the normal inward rotation of the lower extremities by the union of their post axial or peroneal borders and partly by the approximation of the acetabula due to the flattening of the pelvis.

In the fifteen years since 1900 twenty symphyliac monsters including my specimen have been reported in the world's literature. Of these eleven were true sirens (*sympus apus*) seven were examples of *sympus dipus* and only two were uromelic monsters or *sympus monopus*. The skiagram (Fig 1) shows clearly the markedly deficient pelvis to which is attached a single femur well developed and a tibia with its ankle-bones and foot. Apparently there is but a single formation throughout this extremity contrary to the usual findings.

2 CRANIOPAGUS

The second specimen which I show here—a wonderful example of *craniopagus parietalis* belonging to the class of terata an adidyms—was delivered by Dr S F Vira bella in the Columbus Extension Hospital after a labor characterized by extreme dystocia. They are twin girls whose delivery according to the interne Dr Amante Rongetti was accomplished as follows. The first child presented as a face and in the efforts which were made to deliver this the head was almost severed from the body and one arm was cut off. The second child was extracted without much difficulty (Fig 2).

In this form of double monster the two bodies are joined at some homologous portions of their cranial vaults. The junction very rarely involves the brains but is confined to the skull and scalp. The longitudinal axes of the two bodies are not always parallel as in *thoracopagus* but the pelvic extremities may diverge from one another (Hirst and Hirsch).

The head may be united by the forehead—*metopagus* or *craniopagus frontalis*—which is the rarest of all forms by the occipital bones—*occipitopagus* or *craniopagus occip-*



Fig 1. Skiagram and photograph of uromelia or *sympus monopus*. One of the two fellows was born alive and the other died.

italis and by the parietal bones—*parietopagus* or *craniopagus parietalis*—the most common variety which Baudouin calls the true *craniopagus*. In this variety the heads may be twisted on one another to varying degrees. From this peculiarity Baudouin recognizes four varieties of *craniopagus parietalis* as follows:

1. *Parietopagus* without any twisting of the faces corresponding as in the case of Joly and Peyrat (1874).

2. *Parietopagus* with torsion of the bodies. A. Complete (angle of 180°) the faces looking in opposite directions as in Villeneuve's case (1829) and in my own specimen (1914).

B. Partial (angle of 90-95°) a. Torsion to the right side (as in the case of Versailles in 1861) b. To the left side (as in the case of



Fig 3 Craniopagus parietal

Emu Lisa Stoll—Baudouin in 1912) (See Fig 4)

Saint Hilaire believed that craniopagus did not occur in animals. Since 1836 how ever several cases in animals have been observed particularly in chickens. Thus Dareste (1861-65) Monezzia (1879) and M Koch (1883) have published reports of such cases and what is much more important Dareste¹ in the course of his careful investigations had the good fortune to find in a hen's egg a craniopagus in the process of formation. He has also deposited in the museum at Lille a specimen of craniopagus frontalis occurring in a wolf.

Ahlfield described twelve examples of craniopagus seven of which lived for some time after birth. Living and surviving cases of craniopagus as reported in the literature are as follows (Baudouin)

C Dareste Recherches sur la production et le développement des monstruosités ou cas de tératogénie expérimentale d'œuf p 3
pl xv fig Paris 86

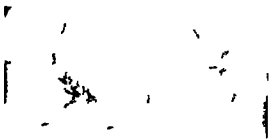


Fig 3 Skullgram of craniopagus parietal (Fig 2)

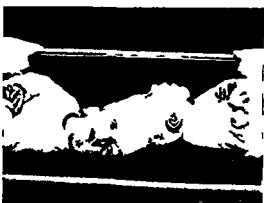


Fig 4 Baudouin case (living craniopagus)

- 1 Case of Lemery of Blois (1703) These children were baptized therefore were born alive after an easy delivery
- 2 Case of Albrecht (1733) The children—both females—lived one year
- 3 Case of Barkow (1821) Two girls who died at the moment of birth
- 4 Case of Villeneuve (1829) Males born at seven months and dying almost immediately
- 5 Case of Mazurier of Versailles (1861) The children died on the eighth and ninth days
- 6 Case of Louis Blanc (1893) Two girls who survived about five months
- 7 Case of Kissinger (1908) Males who survived six days, one dying three hours after the death of the other
- 8 Case of Baudouin (1912) Emu Lisa Stoll who were still living at the last report

Warschauer in 1909 stated that up to that time there had been reported 21 cases of craniopagus of which 14 were examples of parietalis 5 examples of occipitalis and only 2 examples of frontalis to which he added a third. To these 22 cases must now be added Baudouin's and Bernbach's cases and the case I present tonight all samples of parietalis making 25 cases to date 17 of which or 68 per cent were specimens of parietalis.

An interesting question arises as to the possibility of operating upon these children. Baudouin believes that it might be possible to do so in the first or second year since the brains of these children are distinct. How

ever up to the present time the operation has not been attempted. The one essential condition if any success is to be obtained according to Baudouin¹ that the operation be done before the death of one of the twins.

As the skiagram shows (Fig. 3) there is an absence of the cranial vault in both babies otherwise the shadow appears to be normal.

3. ACEPHALUS

The third specimen is this curious sample of acephalus thorax of the class of omphalotes which was delivered by Dr. Arthur C. Lehner after an easy twin labor at full term. The monstrosity presented first and was followed by the stillborn twin. This was the fifth pregnancy occurring in an American woman 35 years of age. As you can see to the almost shapeless trunk which shows the point of attachment of the umbilical cord are appended two rudimentary limbs, one ending in a peg leg and the other in a cloven hoof (Figs. 5 and 6).

In acephalous monsters there is a complete absence of the head and usually of the upper extremities. The latter may be represented by stumps covered by the skin of the body. Occasionally one upper extremity is present though not perfect (acephalus monobranchius). Acephalus is the commonest condition among the omphalotes (Hurst and Pierson). As you all know omphalotes are embryos or fetuses dependent for their imperfect growth in the uterus upon another embryo or fetus usually well developed that supplies the circulation of blood for both by means of extensive and intimate anastomoses of the umbilical and placental vessel.

Breus's theory of their development—that now generally adopted—is as follows: The acardiaca (a name often applied especially in Germany to these monsters—from the frequent absence of the heart) on account of early disturbance of their embryonic development are such highly defective products of conception that they are not capable of an independent circulation nor of an intra-uterine nutrition. They continue to develop and to grow however because a supplementary circulation maintains their tissues in a living and growing state. They are



Fig. 5 (below) Stillborn twin, one normal, the other acephalus thorax, more properly cryptocephalus.
Fig. 6 (above) Side view of case shown in Fig. 5.

usually found in twin labors together with a normal fetus for under these circumstances by anastomoses of the umbilical vessels of both fetuses the vicarious circulation is most easily established.

According to this theory then the omphalote dies and no longer possessing an independent circulation is nourished imperfectly by the blood current of the autosite. The infrequency of the monster would seem to controvert the theory of reversal of the blood-current by a stronger (the theory of Claudius and Ahlfeld) for as Breus has indicated omphalotic monsters should be very common if their production depended upon such a reversal since in all uniovular twins anastomoses between the vessels of the two cords are invariably demonstrable and one fetus is usually better developed than the other.

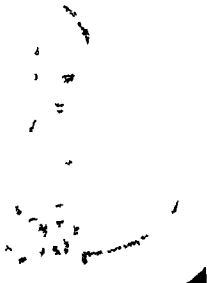


Fig 7 Ski gram of Do land's case of cephalothorax, more properly cryptocranium showing well defined head bones

Ahlfield collected fourteen cases of acephalus in which the heart was present in some degree of development and in some cases was functionally active until birth as proved by the presence of trabeculae carneae. The term *acardiacus* is therefore inappropriate.

The characteristics of acephalous monsters are as follows. The parasite is usually born last with the placenta. Edema of its tissues is almost constantly noted. There is an overgrowth of connective tissue especially subcutaneously and in this situation there are developed lacunae and cysts. There is always a median fissure of the thorax and the thoracic organs are absent or very defective. The abdominal and pelvic organs are best developed—a point that favors the theory of reversal of the circulation since in that condition the lower portion of the body receives first the freshly aerated blood. The genitourinary apparatus is usually well developed. The umbilical cord is inserted in the middle of the very short belly and there is frequently a hernia into the cord. There is but one placenta and usually two amniotic cavities.

The skiagram (Fig 7) of this remarkable specimen presents a very unusual appearance and the case is probably unique in the annals of obstetrics. As may be clearly seen not only are some of the ribs and the thoracic spinal column well developed but there are also present the cervical vertebrae and a portion if not all of the cranial vault. The sagittal suture may be clearly traced and the outlines of the parietal and occipital bones with the small fontanel are very distinct. Less marked but still readily defined are the frontal malar and maxillary bones. As far as I know this is the only instance on record in which head bones have been noted as being included in the body tissues of these acephalous monsters.

Since 1900 there have been reported in the world literature twenty seven cases of acephalus including the specimen presented tonight and in none of these and certainly in none of the specimens recorded prior to 1900 have head bones been noted. It would appear therefore that there must be described two distinct varieties of the so-called acephalous monsters—one in which no head bones are to be found the group acephalus proper and secondly those cases in which a head or head bones will be found enclosed in the thorax to which the term cryptocranium should be applied.

Just how such a curious condition could occur it is difficult to conceive. A plausible explanation would appear to be the following. The smaller foetus dying in early intra uterine existence the nourishment of the tissues of the dead product is assumed by the autolysis or living foetus through the interfunic anastomoses. There then results a growth of the lowest grade of tissue cellular connective tissue in the deceased embryo and this tissue develops up and over the neck and head of the dead product incasing these as it were in a mesh of new formed substance and totally concealing them so that from a superficial examination the monster appears to be headless.

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DEPARTMENT OF TECHNIQUE

THE LATEST WORD ON THE SUBJECT OF SCOPOLAMINE SEMI-NARCOSIS

By CLORCE CLARK MONROE AND MILDRED KAYE

IN order to verify or disprove the claim made in recent society reports and medical journals concerning the value of the Freilurg method a special trip was undertaken by the writer who spent November and the early days of December in visiting various points where the scopolamine treatment has been carried out in any extent in this country. The itinerary included a number of hospitals in several cities. Georgetown Hospital at Washington, D. C., where Dr. Henry D. Ivers has been using it since July in his charity service was first visited. Five cases were under treatment or in their puerperal stage. He has not yet adopted the method in private practice. His results have been generally satisfactory. He has noticed neither fetal or physical injury in labor nor hemorrhage. He is not yet ready to make a report as to his conclusions.

At Johns Hopkins Dr. E. W. Under Dr. J. Whitridge Williams is trying out a series of cases. Dr. Williams believes the Freilurg technique should not be condemned but is entitled to be tried out in a scientific spirit.

The Jewish Maternity Hospital in New York has on its record 350 cases of patients treated under scopolamine. The story of the three cases of insanity reported in the newspapers was then explained. The first case had been twice before delivered. She developed puerperal mania with such terror that she had a third attack of derangement. In neither of her former labors did she have scopolamine. She was sent to the asylum. The second case was a woman with delusions who did not have to light but insisted she had been beaten. The third case was one which was being given the treatment at the Jewish Maternity through Nathan Straus, the philanthropist and Arthur Brisbane, the newspaper correspondent were making the rounds of the Jewish quarter in the Lower East Side. As they entered the room where the case was just starting in labor the patient, startled by seeing strangers in the room, reached up and bit the face of the nurse. She was put into the

ambulance and sent to the psychopathic ward at Bellevue. She was discharged next morning as cured. Dr. Scourber of the hospital staff who related the cases was in charge of the last two. Two other cases of mental symptoms have occurred at the Jewish Maternity this fall neither of which had any lamine.

Dr. J. Clinton Edgar of the Bellevue Hospital is reported in a new paper interview to have said insanity does not result from the use of the drug.

Dr. J. O. Sisk of Brooklyn has had only three cases. These were in the Jewish of Brooklyn the Methodist and the Long Island hospital. He had three cases of a psychosis of the newborn but no mortality. All of these were in private patients. In thirty cases one series of four deliveries was done eight times. He does not approve of the Sigel method which was put into effect at Freilurg by Dr. Sigel after Krönig and Gau went to the front. The modification depends on the routine use of narcophin or morphine throughout the case and was used at the New York Lying-in Hospital by Dr. Brothman in a series of twenty-eight cases in several of which there was more or less fetal asphyxia.

Dr. A. A. Darr expresses himself as being neutral. He is present at a variety of meetings, magazines and newspaper articles not to mention participation in meetings advising men what to do in the matter of the use of the drug. Dr. George W. K. Smith, one of the chairs of the American Journal of Obstetrics, is of the opinion that a drug should be administered in such a way as to include many men without experience in preparation to use the treatment.

Dr. W. H. W. Knipe of Gouverneur Hospital who spent the summer in Freiburg adopted the Freilurg method rightly in his service. He included the use of the imported drug which is put up by the hospital drugist with manifest to prevent deterioration of which much of the ill effect has been attributed. Dr. Knipe has in

patient up early say the third day and out of hospital the fifth in accord with the Freiburg routine. These patients are given exercises the first day and increased the second. He is not yet ready to report his conclusions. About seventy five cases have been treated at Gouverneur and no mortality has occurred. Twelve cases were in the wards and interviewed each of whom replied in response to inquiry that if she were to be again confined that she would want twilight—because she had no pain. As a matter of fact those who were seen seemed to undergo the same suffering that patients experience under ordinary treatment but with varying degrees of amnesia forget it subsequently.

At the Lying In Hospital the cases of scopolamine have been largely in the service of Dr Harrar and Dr McPherson. The former explained that the method was undertaken for the purpose of counteracting an ill advised wave of lay enthusiasm which was sweeping over the country by demonstrating that the treatment was not a success. Dr McPherson said they held no brief for the system but are still of open mind. The results attained thus far have so satisfied them that they are continuing the observation until they are finally convinced. They are certainly not condemning the treatment on the present findings. The average number of injections at the Lying In has been four. The last two cases seen by the writer took respectively eight and eleven doses for complete amnesia. Sixty five cases had been given the treatment since the report at the American Association of Obstetricians at Buffalo. No untoward effects have been observed.

The attending and resident men in the various hospitals visited are generally conservative in their attitude toward the Freiburg method although in some instances intensely enthusiastic. They were all most certainly courteous in the way they received the writer.

An exceptional opportunity to hear the views

pro and con was afforded on the night of November 24 when a meeting of the Obstetrical Section of the New York Academy of Medicine was held which was called at the request of the Committee on Hospitals and Health of the Academy to consider the attitude which the Academy should take toward the subject. As the session was executive nothing should be published of the transactions until the Academy officially gives out its report.

The conclusions drawn by the writer after the unusual opportunity to investigate the Freiburg method as applied in this country are not different from those given in the paper published in the December number of the *Journal of the Kansas Medical Society*. It is a hospital procedure and not universally successful. It can be safely used only by those who have been especially trained. Rigid adherence to the Kroenig technique must be enjoined otherwise failures should not be charged to it. As to hemorrhage unusual necessity for forceps foetal asphyxia or after results of untoward nature they were not observed in the cases it has been the good fortune of the writer to have witnessed.

On the other hand no caution is too extreme nor faithful watchfulness too exacting in the protection of mother and child and no obstetrician should undertake the treatment unless he is willing to devote his entire time to the individual case after the first dose is administered until the labor is terminated.

There can be no doubt that the final benefit to be derived from this remarkable discussion will be that obstetrics will be put on a plane of dignity in the eyes of the laity as well as the general medical profession. Our work will again be classed as one of the three great departments of medicine. It must emphasize the need of maternity hospital service up to the standard of the Chicago Lying In the Sloane and the New York Lying In hospitals in every metropolitan community in this country.

THORACOTOMY IN UNRESOLVED PNEUMONIA

BY RANDOLPH WINSLOW, M.D. BALTIMORE, MARYLAND

As a result of accident and more or less of mistaken diagnosis I have had two experiences that have been of such interest to me that I wish to present the details of the cases to you for your consideration and criticism.

CASE 1: Several years ago a boy 16 years of age brought from the country to the University Hospital, Baltimore. He had had no attack of acute lobar pneumonia but the symptoms did not cease and he was brought to the city for treatment. He was running high and irregular temperature and had a physical and other signs that it was thought he must have empyema. Aspiration, however, failed to locate pus. As he did not improve under treatment it was thought he must have an encapsulated collection of pus with the pleural cavity and thoracotomy was decided. Under general anesthesia the chest was opened but no purulent collection could be found. The lung was hard and collapsed and with adhesions to the chest wall. The diaphragm was broken up and drainage tube placed in the pleural cavity for a few days. Almost immediately the temperature fell to normal and a short time he was convalescent.

CASE 2: Mr. S., age 34, entered University Hospital on July 1, 1904. He was suffering with suppurative empyema of the left pleural cavity. The temperature had been present for several years, was not painful but had suppurred and had been incised several times. He had no gonorrheal infection, other genital lesions and the swelling was thought to be tuberculous and so proved to be on removal. The pulse and temperature were normal, the leukocyte count 2,000, differential hemoglobin 95 per cent.

On July 8, 1904, complete removal of the glands was done under ether anesthesia. Following the operation he did well for several days and then was taken to the operating room for thoracotomy. On the left side, indicating pleurisy, no gradual consolidation of the lung as shown by pectoriloquy, bronchophony, cough, expectoration, and the usual signs of pneumonia. His temperature was irregular, varying from normal to 101.5° F. The chest was opened by the 10th to 11th ribs. On July 16 there was leukocytosis of 13,500. No malarial parasites could be found. It was feared that he had pyemia. Aspiration failed to find a collection of pus, but as his symptoms continued without improvement it

was determined to explore the left pleural cavity. This was done on February 14 under nitrous oxide and oxygen anesthesia. No pus was found but the hard and consolidated lung was extensively adherent to the chest wall. These adhesions were broken up and tube drainage instituted. A few days there was an improvement in his condition and on March 4 his temperature became normal. On March 14 he left the hospital for his home in North Carolina, and soon was able to resume his work.

In cases of acute croupous pneumonia resolution ought to occur about the tenth day when the temperature drops and convalescence begins. When the temperature remains elevated and irregular after this period it is a cause of great apprehension. It may mean acute tuberculosis but usually it indicates empyema. In such conditions it is proper to explore the chest and seek to locate the pus, but even if we do not find pus I think the pleural cavity should be opened and explored and drainage tubes inserted.

This was the treatment adopted in the cases reported after ample time had been given for a spontaneous recovery.

Whether the improvement in these two cases was merely a coincidence and not a sequence of the treatment I do not know but I do know that they were progressing unfavorably before the operation and speedily became convalescent after it. Whether the improvement was due to the loosening of the adhesions or to the drainage of the pleural sac though there was nothing to drain I do not know. We know that improvement and cure follow the injection of gases and air in some cases of tuberculosis. May it not be that the benefit observed in these cases of unresolved pneumonia was due to the entrance of air into the pleural cavity causing increased atmospheric pressure on the lung?

Read before the Southern Surgical and Gynecological Association, Asheville, North Carolina, December 3-10, 1904.

SUCCESSFUL TREATMENT OF A BICHLORIDE POISONING CASE BY HYDRAULIC IRRIGATION THROUGH CÆCOSTOMY OPERATION

BY J. HARTLEY ANDERSON, M.D., F.A.C.S., PITTSBURGH

Surgeon, Western Pennsylvania Hospital

In view of the widespread use of bichloride of mercury and the number of fatalities from poisoning by any new method which is suggested may merit at least a trial in suitable cases,

if it is reasonable and well founded. The history of the case and treatment chart is preceded by a brief toxicological résumé. A résumé of the toxicology of acute bichloride of

Read before the Southern Surgical and Gynecological Association, Asheville, North Carolina, December 3-10, 1904.

CHART I. MABELL D. JULY 21 1914. CLINICAL REPORT FOLLOWING OPERATION

	Water into Cecum	Water on Rectal Tube	Catheter Urine	Intestinal Motility	Urine Analysis	Feces and Drainage Examination (Mercury)	Blood pressure
July							
	736	903	No record of large quantity	Increased quantity over flow	000 few epithelial cells acid white reaction	Specimens lost by rise	
	736	310	30	Large quantity			
2	940	7	3	Large quantity	Urea .003 per cc		
4	990	35	65	Large quantity	Mercury absent	Mercury absent	
5	384	38		Large quantity		Trace of mercury	Systolic 35 Diastolic 75
6	393	9	4	Large quantity			
7	5	68	5	Large quantity	Trace albumin red blood corpuscles hite blood corpuscles	Mercury absent	Systolic 90 Diastolic 55
8	64	64		Small quantity	Mercury absent 007 epithelial cells white blood corpuscles	Mercury faint trace	
29			54	Small quantity			
30	64	36	3	Small quantity	Trace of albumin white blood corpuscles red blood corpuscles no casts		
31	80	3	316	Large quantity	Faint trace albumin occurred white blood corpuscles hite	Trace of mercury (10th day)	
Aug	3	76		Large quantity	Acid epithelial cells hite blood corpuscles mucous		
	384	31		Large quantity			
3	96	83		Large quantity	3 acid epithelial cells few albumen negative sugar negative		
4	Stopped	Tube removed	6	Voluntary micturition Enuresis stopped	3 albumen and sugar negative alkali white blood corpuscles few		
5			Stopped	Voluntary micturition Enuresis stopped			
6				Voluntary micturition			

mercury poisoning shows the following points. A fatal dose taken by the mouth or absorbed by injection is 3 to 5 grains. Recovery has taken place by the prompt effects of emetics and albumen from much larger doses taken by the mouth. Hence the question of the absorption by reason of the solubility and diffusion is paramount for emetic washing and antidote treatment.

Clinical pathology. A study of the course and lesions of poisoning shows the immediate absorption into the blood, temporary deposit in all tissues, resecretion of mercury salts into and inflammation of mucosa of certain areas of the alimentary canal, severe renal inflammation, weakness of heart muscle and blood destruction.

The intensity of the inflammation in the lower third of the ileum and ascending colon, the serous or bloody albuminous urine attracted my attention. As the nephritis increases the quantity of urine diminishes until the third or fourth day when there is a total

anuria. There is a period of quiescence and apparent improvement, then out of a clear sky the fatal symptoms of weakness and collapse happen. In the early stages the kidney is enlarged and oedematous by a diffused inflammation. Decompression by incision or decapsulation relieves the circulatory arrest and some secretion of urine usually follows. The conclusion of statistics and experiments on animals is discouraging in this line of mercury treatment.

The clinical symptoms of anuria are very deceiving. We do not have the preliminary symptoms of uræmia of medical nephritis. The mind may be clear and the patient comfortable until the heart muscle is weakened to the breaking point by circulatory changes caused by the reabsorbed mercury. Resorption and resecretion take place in the alimentary tract particularly the colon and the patient dies more from the toxic effects of the mercury than from uræmia although that has yet to be decided.

The clinical symptoms of poison of large medium and small doses are too well known to need repetition.

Distribution and elimination may be briefly stated as follows:

1 The distribution of mercury bichloride in the tissues is not well studied so far as I am aware. That of calomel is better known. Suffice to say that mercury elimination takes place largely by the stools and vomit.

2 The deposit of metallic mercury in the tissues has been affirmed by Taylor. These accumulations are non toxic and require further study.

3 The iodide, oxide and sulphide as well as the albuminate are only temporarily insoluble in the tissues.

4 The alkaline chlorides as common salt solution should not be used in treatment of bichloride cases, because of disease of the kidney and heart muscle and because it increases the solubility of mercury. For irrigation and intravenous stimulations 20 per cent dextrose and glucose solutions are less dangerous and more useful.

5 The mercury in circulation cannot be precipitated by any known chemical intravenous method.

The answer to the question of restoring secretion and elimination of kidney by the operation of decapsulation is shown partially by report of two cases by Tisserand. Decapsulation of kidney for acute toxic nephritis with anuria followed by reestablishing secretion both patient succumbed to the poison.

Case 1: Female aged 33 absorbed 2 gm of cyanide of Hg. On the fourth day anuria was complete. At this stage decapsulation of the right kidney was performed. The kidney was enormous and very congested. After the operation the secretion of urine was 75 cc second day, 15 third and fourth day. The patient died on the fifth day, or ninth day of disease, despite the reappearance of the urine.

Case 2: Female aged 44. Intoxication by sublimate. Anuria beginning the fifth day. Decapsulation of the right kidney which was very large and congested on the tenth day. Injection of glucose serum. Urine 75 cc first day. No spontaneous urinations after this. Progressive weakness followed and the death on the tenth day after decapsulation.

A topey right kidney (perated) appeared normal but the left greatly congested.

In spite of the unsuccessful issue in the two cases the author considers that the question of decapsulation must be further considered as a curative agent.

When I first performed the operation of decapsulation of the kidney in 1893 it was for

anuria from an infected kidney. Diuresis was produced and I have been hoping to prove its value in mercurial nephritis. After a careful study of acute congestion of the kidneys for over twenty years I am convinced that acute non-secreting kidney is not the starting point for bichloride poisoning. Anuria may exist for a number of days and till the patient recovers providing the cause of inflammation has been eliminated or diminished. The study of "provoked polyuria" by Albarran demonstrated the work which may be accomplished by diseased kidney tubules.

When the following opportunity arrived I put in practice a long thought of a scheme for treating bichloride poisoning.

M. D. H. No. 5,387 age 29 female U. S. Marine. Admitted to Dr. M. C. Cameron's medical service 8:30 A. M. July 1904. Chief complaint: Pain in epigastrium and over the entire abdomen, sore throat. Patient had taken 10 gr (one and one-half 1/2 gr bichloride tablets) having crushed the tablet finely and swallowed them with a glass of water at 6 A. M. on empty stomach. Previous history: Sore throat fever when child. Eight years had tubercular disease of the right hip and knee. Had been operated upon at St. Francis Hospital for a joint. Present history: Brought in at the West Penn Hospital at 8:30 A. M. She had tried to swallow raw eggs but had failed. Stomach was washed with milk by nurse. Case was transferred to me by Dr. Cameron on the evening of the 31st.

Symptoms: Acute pharyngitis, stomatitis, painful oesophagus, and stomach severe pain in abdomen and bowels, and bloody diarrhoea. Relief by morphine. Total suppression of the urine except a few drops of blood serum found in the bladder.

The evening of the 1st of July I gained consent for operation. Lateral as given and caesarean performed, and rectal tube so that it fit tightly and the following treatment was carried out: Irrigation can was hung 18 inches above the patient and rectal tube inserted the rectum and the other end placed in a bucket under the bed.

Continuous irrigation of the colon with ammonia after each 15 minutes or so. Saline enemas were added: try their value but from which no deductions are made. These were calcium sulphate gr 5 quart first day potassium iodide gr 5 quart on second and fourth day, and after fifth day 5 quart of glucose solution for its urticant and hypertonic effect. Rhus oil was given every 2 hours by mouth and 4 oz by rectum my three times a day for protect antiseptic, and emollient effect.

The large quantity of fluid used (51 gallons) had the following effect: First of washing the colon second, diluting the mercury in all the secretions of the body and diminishing the local effect of mercury on the kidney elevating the blood pressure allaying thirst, etc.

A fairly constant blood-pressure as maintained on the fifth day systolic 35 diastolic 55 on sixth day systolic 100 diastolic 55.

The pulse was rapid and weak at first but improved after five to eight days. The rate was high as 130 on third day gradually improving to 100, and after three weeks to normal. The temperature on the fourth day was 99.5° orally it was subnormal.

The interesting results in the treatment are the urinary effects and of the large quantity of water in the colon (see Chart I). After the first day the colon flow was given intermittently. When the colon was full of water under pressure the kid. ex. would secrete copiously when the flow stopped not a drop of urine would appear. The total quantity of water secreted by the previously anuric kidney was surprising. As a result we had a continuous overflow of the bladder it was impossible to ascertain how much was secreted as the nurses would fail to catheterize often enough and it was lost in the bed. It will be noticed in the report that the quantity of water passed by rectum varied very much. It was lost in one way or another by the overflow of vessels and through other nursing difficulties. The first day 736 ounces of water was given by tube and 900 ounces by rectum but the tubes did not show the true state of affairs. Some water was given and not recorded. The quantity was always less by rectum except on the 26th. Much urine was lost. For fourteen days irrigation was carried on in this manner except for two days (28th and 29th) when the tube permitted leak; the cæcostomy. The free secretions of the kidney recurred.

The urinary findings are interesting. From total anuria before the operation the quantity rose rapidly in the first twenty-four hours. The record was lost of the quantity as sent to the laboratory except the nurse reported that it began shortly after the operation. On the second day 130 ounces were recovered by catheterization the rest was lost in bed. The urine was examined for mercury and none found. The chart shows the daily quantities. Urine reports following the operation.

July 1,000—Acid Few epithelial cells Mercury negative

July 3—Urea .003 gr per ccm N. gative for mercury
July 24—Mercury absent in the urine

The most that was found was traces of albumen epithelial cells white blood corpuscles red blood corpuscles until the end of about fourteen days when traces of inflammation had faded. *Y. merc. y. u. s. fou. d. n. th. watery urine*

The faeces were examined by D. Rosenbloom on the July 5 and mercury was present on the 27th mercury was absent on the 28th it was found and on the 31st it was present. You will note that all mercury found in the faeces and that as late as the 31st of July, or tenth day.

Stomach analysis on the 31st shows free acid absent total acidity equal to .24 ccm of decinormal soda hydroxide an increase of mucus and blood was present. No mercury.

The cæcostomy was closed on August 4, 1914 but reopened. Was closed on August 1, 1914 and has remained closed. Present condition is good. Mercury seemed to benefit her tuberculosis either mercury benefited her or the improvement was due to irrigation of the bowels or rest in bed. She eats everything there is no sign of stricture of the oesophagus or ulcer of the stomach. On the media occurred during convalescence.

She has been taking blood pills for some time and she has now good color. Urine since closing of the cæcum.

September 5 specific gravity 1.017 negative for albumin sugar absent some epithelial cells and white blood corpuscles. September 9 specific gravity 1.004 acid reaction no albumin sugar absent many white blood

corpuscles. September 30 specific gravity 1.017 normal no albumin sugar absent epithelial cells.

I have watched the urine for two months now to determine if reduced mercury in any quantity might be remaining in the tissues and cause recrudescence of intoxication.

There is one question in this case as in all poison cases and that is as to the quantity of mercury absorbed in 2½ hours before the antidote was given. Would this quantity have produced fatal results had we not made use of hydraulic irrigation? Quantitative analysis was not made of the gastric lavage nor of the first washings of the colon owing to a misunderstanding of attendants. One proof that a quantity was retained is shown by a trace found as late as the tenth day.

In cases where large quantities are ingested I think again I would make the fistula in the ileum so as to include the lower third. If the urine was not secreting after the third or fourth day of irrigation I would advise decapsulation of both kidneys in addition. Decapsulation does relieve tension and urine does flow afterward. The stomach may be washed out repeatedly by syphon so that gastrostomy will hardly ever be necessary unless the patient were insane or having oesophageal hæmorrhages. A very important protective agent is paraffin oil. It certainly relieves the burning gastric pain. I have previously employed it in ulcer of the stomach and had the same experience with it. It relieves the intestinal colic and rectal tenesmus in the same manner.

After the usual treatment of emetics and cathartics associated with the use of antidotes as milk, eggs and magnesia and the use of glucose serum intravenously for the shock, and in cases in which there is reason to suspect absorption of mercury in a dose sufficient to inflame the mucosa of the intestinal tract and the renal tissue producing anuria and the general toxic effect on the other vital organs and cases in which resecretion and reabsorption occur in the colon as I believe it does I would conclude that early cæcostomy and hydraulic irrigation is the most efficient and logical treatment.

I cannot find that the treatment has ever been suggested or tried before. Hence the reason for publication.

EXTRAPERITONEAL CÆSAREAN SECTION

WITH A REPORT OF TWO CASES

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IN his instructive paper on cesarean section Nicholson (1) speaks of the scarcity of case reports in the American literature and his statement prompts me to report two cases which have come under my observation. Additional interest is attached to the cases because infection was demonstrated in both.

In spite of the present widespread knowledge as to the dangers attached to attempts at dilating the cervix in spite of the knowledge of the dangers brought about by repeated attempts at delivery and by repeated examinations even by physicians who do know how to be clean the obstetrician still finds that most of the cases of contracted pelvis come to him in a condition that renders the classical operation impossible. This is especially true in localities where midwives attend a great number of the cases.

The mortality of the classical was high until twenty years ago but since the advent of asepsis it has been decreasing. In the last ten years the causes of mortality have been critically studied. Routh (2) has tabulated the mortality in year periods as follows:

TABLE I

1890	1891	1900	1905
35.7	6.6	6.6	0.7

This table shows the decline in mortality as progress in asepsis increased. Statistics covering various periods since 1883 show also how high the mortality was, despite the progress in aseptic operative technique until the condition of the patient as regards infection received broader attention. From 1890 to 1905 Routh (2) reports a mortality of 13.65 per cent from 1883 to 1907 Winkel (3) reports a mortality of 6.25 per cent and in the same period Davis (4) report in his first series a mortality of 16.67 per cent and in his second series a mortality of 5.79 per cent.

That mortality has steadily decreased of late years as strictness in keeping the patient free from infection has increased is strikingly shown in Table II.

TABLE II

	1 Labor Membrane Ruptured	1 Labor Membrane Intact	N Examination	Before Labor
Routh (5)	35.4	4.77		4.5%
Banasz (6)		7.4		
Winkel (3)		6.25		
883-907				
Pestalozza (7)			3.03	
Doderlein (8)			3.33	
Zweifel (1)			1.86	

Probably every obstetrician at the present time requires that there be no examination by midwives and none repeatedly even by careful physicians if the classical operation is to be performed. Attempts at dilating the cervix or other attempts at delivery are also regarded by the great majority as contra indications to the classical. The following table is a summary of the contra indications to the classical as given by various clinicians cited under the names of the compilers.

TABLE III

CONTRA-INDICATION TO THE CLASSICAL

	After Labor Membrane Ruptured	One Unclean Examination	Repeated Examinations	Membrane Ruptured	Prolonged Labor	Membrane N Examination	Membrane I Examination	Membrane I Examination
Veit ()	+							
Lorandine ()		+	+	+				
Cholmogoroff (3)			+					
Morison (4)	+	+		+				
Kistler (5)		+						
Kretschmer (6)		+						
Rosner (7)								
Peterson (8)								
Banasz (6)	+							
Bürger (8)	+							
Pankow (9)	+							
Tweedy (20)			+					
Bell (33)			+					

From this table it will be noted that of thirteen clinicians, eight will not permit a classical if the case is one in which the membranes are ruptured or there have been repeated vaginal examinations or one unclean examination four will not

permit it if there has been one unclean examination. This practically limits the classical to those cases that come in before or at the onset of labor or to those cases which the operator knows have been examined by an attendant who has mastered the technique of making a vaginal examination aseptically. This strict limitation will be necessary until a more correct knowledge of the proper indications for the application of forceps and for other efforts at delivery such as manual dilatation has become more widespread. This restriction will always have to be enforced very rigidly in cases which have been attended by midwives. In and around Greensburg the midwives are for the most part of Austrian origin. They were once fairly well trained but they have degenerated through lack of regulation and control. It would be well worth while to have every midwife report to a state hospital every three years, for one month of renewed training in asepsis. If a midwife at least in our locality has examined a case once the case is usually regarded as infected in fact. I find that nearly all the cases of puerperal sepsis have been attended by midwives. Staphylococci and occasionally streptococci have been demonstrated *in utero* in many cases which have been cared for by midwives while those cared for by attendants who understand the importance of rigid asepsis and few examinations are usually free. The cases attended by midwives have a larger percentage of morbidity (Rotunda standard) than those attended by careful physicians. From these facts I conclude that the classical cannot be undertaken with justness to the mother if (1) she has been examined once in an unclean manner (2) if she has been repeatedly examined by any one (3) if prolonged attempts at delivery have been made.

This does not take into consideration the case which is actually infected for such cases of course are excluded. Most of the cases coming to section are emergency cases which have been subjected to several examinations and various efforts at delivery. These cases constitute the majority at the present time as they did in the past when the mortality was 35 per cent though occasionally a patient who had trouble is warned to enter the clinic early enough to protect her from interference. I very rarely see cases come to us, either infected or suspected of infection in which a mortality of at least 16 per cent may be expected from the classical.

How to get a larger percentage of living children and mothers in these three classes of cases is a problem. Pubiotomy offers a partial solution in multipara but in primipara (21 to 30) it is

unsafe and in either category its use is limited to pelvis whose conjugate is more than 7.5 cm. Pure extraperitoneal caesarean at first offered apparently the solution of the problem in the suspected case and the operation resulted in a decrease in the frequency of peritonitis but the extensive disturbance of the cellular tissue caused cellulitis almost as serious (31 and 32). About contemporary with the development of extraperitoneal caesarean section the transperitoneal operation was devised and this operation seems to have the advantage of decreasing the frequency and severity of cellulitis. It appears to have lost favor in Continental clinics, but has been approved by several British and American obstetricians. The technique I use is the same as that used by Tweedy (30).

1 Pfannenstiel incision of skin and fascia

2 Longitudinal separation of recti

3 Transverse incision of parietal peritoneum and of that covering the uterus at the uterovesical fold which is stripped back to the point where it becomes closely adherent to the uterus. The margins of the parietal and uterine peritoneum are then sutured together with a close interrupted catgut suture. The result is that the peritoneal cavity is closed off while a large area of the body of the uterus is exposed but the cellular tissue between the layers of the broad ligament is not disturbed.

4 The uterus is opened longitudinally in its lower segment and the infant extracted. The placenta separates usually spontaneously. If a rent is made in the peritoneal reflection it is sutured at once. The uterus is packed with gauze and the end passed into the vagina. The incision in the lower segment is closed with interrupted catgut sutures. The abdominal incision is closed in the usual manner with drainage if there is a possibility of suppuration.

CASE A P. ge 18 I para. Previous medical history. Husband contracted syphilis two years previous otherwise negative. Course [present] bo. Labor started July 6, 93 patient attended by midwife. Uterine contractions were strong and regular. At the end of twenty-four hours there had been no progress. The midwife made repeated examinations without aseptic precautions; introduced a large and live old into vagina. At the end of thirty-six hours Dr. Evehart was called and his examinations established the following facts: Temperature and pulse normal. Abdominal examination showed uterine contractions very vigorous and regular. The fetus was the second position head not engaged. Fetal heart sounds were good. Vaginal examination showed the cervix dilated three quarters membranes ruptured. Forceps were applied to the fetal vertex without effect. The patient was sent to the hospital. Examination on admission to the hospital: rachitic dwarf height four feet six inches scoliosis rachitic rosary bowed legs bones large and irregular.

Patient very strong with great endurance. Uterus irritable contractions every four minutes duration, 45 seconds. The fetus was in the second position back in front and to the right brow presenting. Fetal heart sounds, 120. Measurement I S 29 I Cr 29 C 20 G 17 cong diag 0.5 C V 8.5. The cervix was three-quarters dilated, brow presenting not engaged. The membranes were ruptured. Temperature 99 pulse 100.

I the hope that the brow might engage and in view of the woman's good condition and strong physique we decided to let her have still a further test of labor. The patient was put in the Walcher position during pains. Nine hours later there had been no advance the head being still movable above the brim and the mother's condition commenced to become serious, the temperature and pulse rising while the uterine contractions began to assume convulsive character and a increased violence. Fetal heart sound 116. Three modes of delivery were possible.

1 Perforation of the living skull. This was not considered.

2 Pubotomy contra indicated because the woman was a primipara and was not fully dilated (2).

3 Cesarean section. This classical was contra indicated because of the high maternal lying down cases which have been frequently examined and with membranes which have been ruptured for some time. The transverse seal was selected and performed forty-two hours after onset of labor.

Course of operation. The child was delivered but asphyxiated. There was erythema and rhinorrhea. The peritoneal reflex was intact. The wound was closed with drainage and the patient left the operating room very good condition and without shock.

Post-operative course. The gauze pack was removed from the uterus at the end of twenty-eight hours. Convalescence was good. Locally the skin incision broke down in two places. These lesions showed little or no tendency to granulate a condition attributed to the pyphitic condition present. At the end of three weeks the lesion had apparently united by second intention but soon broke down again. The patient was readmitted this condition six weeks after the operation at which time the granulating areas were curetted and sutured but they broke down a week later. Mercury and the iodides are used the hope of favoring healthy granulation.

The child revived weighed six pounds fifteen ounces and showed a red edematous beginning of the fourth week signs (syphilis) appeared first the snuffles, coryza and pemphigus of the feet later with rapid emaciation (loss in one week, fifteen pounds) resulting in death.

Case 5. M. B. 23 Italian I para. Previous medical history negative. Course of present labor. Labor commenced November 14, 1913 with mild irregular contractions. The uterine contractions were strong and regular. A physician was called at the end of sixteen hours. Abdominal examination showed second vertex uterine contraction severe for heart sounds good. Vaginal examination. The cervix was hanging like a curtain. There was dilatation of three fingers, the membranes had ruptured and the pulse and temperature were normal. Twenty-seven hours after onset of labor there was no advance the cervix was the same, the temperature was 99.5 and pulse 100. Patient sent to hospital.

Condition on admission. Temperature 100.5 pulse 123. The patient was well built, muscular woman with rachitic rosy. The uterine contractions occurred almost without interval the uterus was tender the left round liga-

ment tense and projecting. Bandl ring was three fingers breadth above the symphysis. Fetal heart sounds 160. Vaginal examination. Vulva, venereal warts. The vagina was dry the cervix hanging like a curtain, one-half dilated the head engaged. Measurement Interspina 29 cm I tercrist 13 cm, ext. conj 0, true conj 7.5 to 8 cm. Thirty-one hours after the onset of labor fetal heart sounds above 160. Transperitoneal cesarean section was decided upon as the operation to be performed.

Course of operation. The operation was complicated by distended bladder and by a loop of intestines that lay in front of the uterus. The infant was extracted. There was a small rent in the peritoneal reflection which was sutured once. The placenta was expelled spontaneously. There was no hemorrhage. The uterus was packed with iodoform gauze and the end projected into the vagina. The patient left the operating room in good condition pulse 100. The infant was born.

Post-operative course. Twenty-four hours good, gauze removed. Second twenty-four hours, post-operative ileus, abdomen distended. Third twenty-four hours, flatus expelled, faeces passed. Abdomen less distended, lochia purulent. Fourth twenty-four hours, ileus ceased abdomen flat gonococci and staphylococci found by Dr. Hill in specimen of lochia taken from uterus. The abdomen was not distended no tender. Temperature: this morning 99.5 pulse 120 temperature in the afternoon 100.5 pulse 120.

For the next seven days the patient ran septic course. Throughout this period there was profuse purulent lochia while the uterus did not involute and there was no secretion of milk. Signs of peritonitis did not develop the abdomen remained flat without pain, tenderness or rigidity showing that the general peritoneal cavity escaped infection. On the fifteenth day the temperature and pulse dropped to normal and remained normal and the lochia gradually became less purulent until on the eighteenth day it was sanguinous. At this time the uterus began to involute sterility. The wound united by first intention a retractor of such extent between the two central turns excepted. Stitches became occurred in these sutures but healed by granulation within two weeks.

The infant gained birth at and three-quarters pounds. It developed no ophthalmia but recovered.

The mother and child are discharged on the thirty-fourth day.

Abdominal examination. Cervix closed well involuted uterus little larger than normal. Six weeks after labor—size of an orange—freely movable in normal position, and was not tender. The infant gained eight pounds within six weeks old.

The patient returned for examination on forty-eight days after operation. The uterus had still further involuted and approached nearly the normal. The infant was in good condition. Six months after operation, a final examination the uterus completely involuted freely movable, and normal position. The cervix was not fixed and there was no evidence of any fistula between it and the abdominal scar.

The transperitoneal method has been used by Sellheim, Tweedy, Hurst, Brumgruen, Frank and Freeland. I have collected detailed histories of twenty-eight cases reported by some of these men to which I have added four cases of Freeland reported to me verbally and the two from my own experience and codified as follows.

Total number of cases	28	8 BÜRGER	Geburtsleitung bei engem Becken. Wien 1908 p 145
Membranes ruptured	19	9 DODERLEIN	Burger's Geburtsleitung bei engem Becken. Wien, 1908 p 145
Examined gynally	26	0 ZWITZEL	Burger's Geburtsleitung bei engem Becken. Wien, 1908 p 145
Repeatedly examined and suppurated	9	11 VEIT	Zentralbl f Gynak, 1910 No 12, 419
Mothers lived	26	12 LORNAUDIE	Zentralbl f Gynak 1910 No 8 970
Infants lived	26	3 CHOLMOCOPOFF	Zentralbl f Gynak 9 0 No 16 531
Union by first intention	8	14 MORSEY	Zentralbl f Gynak 912 No 52 1778
Suppurated	15	5 KETSCHNER	Zentralbl f Gynak 19 4 N 70 366
Drained	1	6 KETSCHNER	Zentralbl f Gynak 1907 No 46 1455
Hours of Labor		7 ROSENER	Zentralbl f Gynak 1913 No 8 294
0 to 10 hours	7 cases	18 PETERSON	Zentralbl f Gynak 19 2, No 28 940
11 to 10 hours	4 cases	19 PANKOW	Zentralbl f Gynak 1910, No 45 1449
20 to 29 hours	7 cases	20 TWEDDY E II	Reports Rotunda Hospital Dublin 1910
30 to 120 hours	5 cases	DODERLEIN	Zentralbl f Gynak 9 0, No. 45 1447
Unknown	5 cases	PANKOW	Zentralbl f Gynak 19 0 No 45 1449
Temperatures		23 HENKEL	Zentralbl f Gynak 1910 No 30 1031
97	6 cases	24 KUBITZKY	Zentralbl f Gynak 1910 N 29 1003
10	7 cases	25 SELIGMAN	Zentralbl f Gynak 19 0 No 8, 89
103°	3 cases	26 FVERSMAN	Zentralbl f Gynak 19 0 No 8 53
Balance not known		27 RUDER	Zentralbl f Gynak 1913 No 4 17
		28 LACAZE	Zentralbl f Gynak 9 3 N 6 694
		29 KREWSKY	Monatschr f Geburtsh u Gynak xxxvi No 4
		30 WEISSEL	Zentralbl f Gynak 1913 No 41 1516
		31 BUDM	Zentralbl f Gynak 910, No. 48 1577
		32 SCHEFFER	Zentralbl f Gynak 19 3 No. 27 1 12
		33 BELL	Zentralbl f Gynak 1913 No 18 677

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4 DAVIS	Zentralbl f Gynak	9 3 N 8, 676
5 ROUTH	Zentralbl f Gynak	9 0 N 45 1446
6 BAKASH	Zentralbl f Gynak	907 No 46 455
PESTALLOZ	Zentralbl f Gynak	910 No 45 445

OPERATIVE TREATMENT OF FRACTURES¹

By WILLIAM R JACKSON M.D. F.A.C.S. MOBILE ALABAMA

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WHEN fractured end of bones cannot be adjusted or coapted snugly by traction counter traction and manipulation or when coaptation cannot be maintained by splints and plaster of Paris then it becomes necessary and proper yet mandatory to resort to measures and procedures that will coapt and maintain adjustment of the fragments. This rule applies to any fractured bone. Delayed or viscous union caused by displaced fragments and interposition of soft tissues require operation also. Most simple fractures can be adjusted without open operation while others demand operative intervention. It has recently been observed that when any fracture is dealt with by open operation there is always delay in union delay of callus formation hence the time for union may be four to eight months in total of four to eight weeks.

The cause of delayed union in operative cases

of fracture is disturbance of the circulation in the end of the fragments caused by handling and the separation of soft tissues the periosteum muscles etc from the bone and injury to the medulla. Callus production is greatest from the medulla then from cancellous then from compact layer.

It has long been taught by Ollier that the periosteum is a bone (callus) producer that the inner layer of the periosteum (cambium) was the most powerful osteogenic agent in the union of bone but since the clear demonstrations of Macewen that the periosteum takes no part in bone production and that only bone produces bone most authorities concede that the periosteum is only a limiting membrane of bone. Macewen showed that tran plants of periosteum alone never resulted in production of bone while bone without periosteum resulted in the reproduction of bone cell and the growth of the

transplant J B Murphy claims that bone-transplants will reproduce bone with or without periosteal covering provided that the *tran plant* comes in contact with fresh bone-cell at *one or both* ends of the bone. Murphy contend that *new bone-cell (osteoblasts)* form from either end of the sectioned bone and circulate through the *haversian canals* of the *tran plant* and while there they receive nourishment and multiply rapidly causing absorption of the old bone cells, the transplant acting only as a *scaffold* or *osteo-conductor* and is therefore not *osteogenic*.

The operative measures most commonly used in the treatment of fractures today consist in the use of plates and screws nail and metal band staples and wires detachable brills and *interosseous* or *intramedullary* transplants of *autogenous* bone. Many cases require only operative coaptation of the displaced fragments plus *plaster fixation*. It becomes necessary to intervene by open incision in the following fractures: Fracture of neck trochanter and upper middle thirds of the femur fracture of the patella fracture of both bones of the leg not always but frequently fractures of the clavicle fractures of the olecranon process Pott's fracture and any fracture where coaptation cannot be effected and maintained.

To obtain the best results in the treatment of fractures repeated examinations by X ray should be made before during and after application of fixation dressings. Most frequently in simple fractures perfect coaptation under X ray will not remain after splints are applied the amount of displacement depending upon the distance from the bone to the splint on the surface of the limb. Overriding angulation rotation and lateral displacements will occur in 85 per cent of all cases hence the open or operative treatment is gaining ground with our best surgeons. While delayed union non union (in some cases) and occasionally infection may mar some of our cases the good results in the great majority of them encourage us to continue to do better mechanical and aseptic work.

TECHNIQUE USED IN APPLYING LIMB PLATES

1 Thorough iodine disinfection of the whole field

2 Securing towels above and below line of planned incision by clips

3 Securing towel to each edge of skin incision by Moynihan's towel clips

4 Have all screws which are to be used securely held by forceps likewise the plate itself held by proper forceps

5 Do not put gloved hands or fingers into the wound. Coaptation is effected by traction forceps and elevators

6 Do not touch that part of any instrument which comes in contact with the tissues

7 Do not handle or touch sponges with the hand (gloved) but always use sponges held with forceps

8 Do not suture the skin but close preferably by metal skin clips. Always denude the ends of bone fragment

9 Put on plaster cast and do not make extension after plates are placed

10 Remove skin clips on tenth to fourteenth day and continue cast till solid union or bone occurs

CONCLUSIONS

1 When plates are used they should be placed on fleshy side of limb and not subcutaneously

2 Screws should fit snugly and hold the plate tightly to the bone. This should be done if a longer plate and more screws are made necessary as any motion prevents union

3 If it ever became necessary to remove a plate it was due to the fact that the plate was not properly placed or the technique was faulty

4 It is not always necessary to remove a plate when infection has occurred

5 That plating of fractures does not always mean bony union as this fails to occur in some cases even after bone-transplants are used. These are the non-union cases. If a little callus forms at the end of ten months union may be confidently expected. If fifteen months fail to show any callus formation then we decide that it is a non union case

6 Compound fractures should not be plated until converted into simple ones

7 Shortening of the limb always follows plating in chronic or ancient fractures because of the necessary resection of the end of the fragments for coaptation

The following cases will show some of the results of operative treatment of fractures

CASE VI. A colored girl 20. Fracture of the upper third of femur caused by fall from height struck up the thigh the great moment. The patient as not seen till one week after the accident being under the care of the family physician during the preceding seven days. Traction and counter traction (Buck extension) failed to coapt the fragments. The patient was anesthetized, and traction and manipulation failed to give satisfactory result. Fourteen days after the fracture occurred Lane's plate placed and the limb put into plaster of Paris cast union per primam ten days and the sutures were removed. The plaster cast was worn two months at the end of which time light motion was perceptible and it

the end of the fourth month the patient was walking without crutches

CASE 3 Female colored age 30 Fracture of middle third of femur with large lateral and overlapping displacement which did not yield to Buck's extension treatment. A Lane's plate was placed ten days after the fracture. In fourteen days the sutures were removed and union was perfect. The cast was kept on for 6 months when the patient was permitted to walk without cast. Union was firm in three months.

CASE 3 Male white age 20 Fracture of lower third of femur which occurred while wrestling. Previous to fracture the patient had disease of lower end of femur with discharging sinuses for past fifteen years beginning when the boy was 15 years of age. The fracture occurred at this weak point of bone. Buck's extension etc. failed to effect a cure. At the end of two months the Lane's plate was placed opposite the diseased side in the healthy tissue. The wound healed in ten days and the sutures were removed but sinuses continued to discharge from the diseased area. A plaster cast was kept on four months when the plate gave rise to irritation and was removed. The removal showed perfect bony union at point of fracture. Necrotic portion of bone and sinuses were curetted and drained and ten months later the patient was entirely well.

CASE 4 Female white age 4 Fracture of middle third of femur resulting from being violently thrown against timbers by hurricane. Fracture of the skull also present.

Treatment of skull fracture trephine, etc. was done by another physician. The fracture of the leg being almost entirely neglected. Two months after the fracture of the femur there was a overriding and angular displacement and four inches shortening were present. At this time the patient's general health permitted operation and treatment of the fracture. A Lane's plate was placed on the outer side of the bone and cast applied. Union by first intention, and sutures removed in ten days but no mobility at the point of fracture. Cast kept on and renewed several times but at the end of four months there was no union and tendency to angulation was present. Six months passed and motion was still marked at the point of fracture. At the end of eight months one of the screws caused necrosis of the overlying skin and necessitated removal of the plate and yet there was no solid union. A new cast was put on and patient put out of doors on crutches and now fourteen months after the fracture the patient walks without crutches. The knee is ankylosed at the time of open operation and continued non-permanent union when it was finally severed under general anesthesia and yet there is only limited motion in the knee joint.

CASE 5 Female white age 7 Fracture of middle third of femur resulting from fall from high fence. Latral and overriding displacement and angulation and shortening. One month after the fracture when tension treatment failed a Lane's plate was applied. Twelve days later the sutures were removed union by first intention. The patient continued in six months no union

after four months. Plate caused suppuration at the end of fifth month. The plate was removed, but no solid union. Plenty of soft callus and great mobility at point of fracture. Cast renewed and patient put to walking with crutches. Ten months since fracture and marked mobility still present in the fracture line.

CASE 6 Male colored, age 37 Fracture of upper third of femur also right humerus and distal tibia and fibula of left leg. An injury received in a sawmill was the cause of the multiple fracture. Coaptation of other fractures was satisfactory, but the femur would not remain coapted. A Lane's plate was placed ten days after fracture. Micheli clips were used in closing the skin and a cast applied. Primary union on tenth day when the clips were removed. The cast was still worn twelve months after operation union was apparently firm. The patient was allowed to be up on crutches and in four months walked without any aid.

CASE 7 Male white age 48 Fracture of lower third of radius and ulna shortening and angulation. The patient was treated in the country. Three months after fracture there was no union. Lane's plates were placed on the radius and ulna. Clips to skin, and plaster cast was applied. Twelve days after operation clips were removed union by first intention. A new cast was applied and the patient is still under observation. It is three months now since operation and there is marked motion at the point of fracture.

CASE 8 Male white, age 58 Fracture lower third of humerus. This patient was treated primarily by another surgeon first by plaster cast then by wiring the bone and the by Lane's plate. All of no avail. There was no union nine months after fracture.

A bone transplant from patient's tibia was inserted firmly into each end of fractured fragment after reaming them out. The limb was put up in plaster cast. Ten days later the sutures were removed and suppuration in the lower end of wound was present. Drainage and plaster fixation were kept up four months and the X-ray failed to show any osteogenesis in the transplant. Mobility and infection persisted. At end of six months, filtration of pus from the transplant threatened the life of the limb when the transplant was removed showing not the least indication of new bone production. On the contrary absorption (osteoclasia) was not ceasing. Result of the fracture was fibrous union (pseudoarthrosis) with fair motion and no flexion of elbow joint.

CASE 9 Male white age 19 Fracture of both tibia and fibula middle third resulting from automobile wheel passing over the limb making a compound fracture. Adjustment under anesthesia was made and plaster (Jiff) applied. The X-ray showed displacement laterally and angulation and shortening. Open operation was later enabled replacement of fractured end which were serrated so that coaptation remained without application of Lane's plates or other mechanical device. Suture and plaster cast. In ten days there was primary union of soft tissues but mobility at point of fracture persisted eight months when solid firm union resulted.

DESCRIPTION OF AN ELECTRIC MOTOR FOR USE IN BONE WORK

By R. F. FARR, M.D. St. LOUIS, MISSOURI

I DESIRE to call the attention of the surgical profession to an electric motor which I have used with great satisfaction during the past eighteen months in bone work. It possesses some features which I believe are worthy of note.

The most important of these is the ease with which it is sterilized. The manufacturers guarantee that it will stand a temperature of 275° F. of dry heat and we have sterilized it repeatedly in the autoclave with the sheets, gowns and other material simply wrapping it in a flannel blanket. Its weight is six and one-half pounds which it seems to me just about right. Lighter motors cannot be held steadily in the hands, and heavier ones are not easily manipulated. This motor may be used on either the direct or alternating current and it has a speed of fifteen hundred revolutions per minute with an abundance of power. The chuck is universal and therefore all drills, saws and other instruments sold in the shops may be used in it.

As this motor is manufactured for the use of the ordinary artisan it may be purchased at a low cost retailing at forty five dollars. A rheostat and foot switch can be attached to the motor at very little additional expense. I have had a small cylinder illustrated at point X made to be used as a handle and to protect the hand from the exposed revolving parts.



This motor DA-002. X indicates handle

I think the sterilizing feature is an important one as the technique of using cloth protection or a metal case is more or less difficult and breaks in asepsis are not easily avoided.

GALL-BLADDER INFECTIONS THEIR TREATMENT FROM A SURGICAL VIEWPOINT

By LOUIS FRANK, M.D., F.A.C.S., LOUISVILLE, KENTUCKY

A COMPREHENSIVE study of the treatment of gall bladder infections from any standpoint cannot be contemplated in a brief thesis. There has been such a wealth of literature upon the subject during the last few years including classical monographs by Moynihan, Kehr and others that your essayist can make no serious claim to originality. There still remain certain features however in connection with the treatment of gall bladder infections which may be worthy of discussion and further elucidation. And we think the final verdict is

yet to be rendered as to the position of the gall bladder itself in cases which come for operation.

It is the generally accepted belief that infections reach the biliary tract through the bile channels as well as through the circulation. It may be added also that the infection may travel through the lymphatics which may serve to explain those cases which occur in conjunction with appendicitis or coincidental with attacks of appendicitis or intestinal disturbances due to the colon bacillus. "Not infrequently the condition (cholecystitis) is associated with appendicular in-

fections of a chronic character especially those forms of appendicitis in which foreign bodies usually fecaliths are present. Whether or not such appendicular infections are the direct cause of the infections in the gall bladder has not been determined but it seems possible inasmuch as bacterial or toxic products are picked up in the derivatives of the portal circulation carried to the liver and there destroyed or excreted in a modified form with the bile. When such infected bile is delayed in the gall bladder cholecystitis may result.¹

At this point we would call attention to the work of Mr Lane and although we are by no means prepared to accept his premises in their entirety nor agree with his conclusions *in toto* we do believe he has opened a wide field—not for speculation but for profound and deep study and experimentation in its relationship to the subject under discussion. It may be that in the extensive field which has been thus opened for study by his work on gastroptosis a bright nugget will be found in connection with gall bladder disease. Some of the chronic infections of the gall bladder without the presence of stone may in great measure be dependent upon coprostasis or may have their inception in fecal stasis to which Mr Lane has attributed many of the ills of mankind and womankind.

There are two types of cases to which we would direct especial attention at this time lying at the two extremes of gall bladder infection. The first type which has been known as cholecystitis without stone formation is met at the beginning of the road. The second lying at the end of the road so to speak is chronic obstruction of the common duct from calculus.

We hear a great deal about the first type and the frequently reiterated statements as to the satisfactory outcome of gall bladder surgery would lead us to believe that cholecystitis without calculi is most amenable to treatment in fact so general has become the belief that gall bladder surgery is extremely satisfactory that those who are aware of the real state of affairs at times find much trouble in outthning the true facts to those who come for operation.

Our own observation has been that cases with out stones are among the most difficult to relieve permanently and we are of the opinion that until within the last year or two our treatment of this type has probably been at fault. We have time and again seen patients subjected to cholecystostomy with drainage of short or long duration who after a few weeks or months of relief

would return with precisely similar symptoms as before the operation. Either we or some of our friends have been in error as to the diagnosis, or simple drainage is not the proper procedure in the majority of such cases. Possibly we have erred in our diagnosis but thus we cannot believe has been the rule as since subjecting patients to more radical procedures a greater measure of success has attended our treatment.

We doubt not that the term chronic cholecystitis has been and will continue to be used as an explanation to cover errors in diagnosis and that behind it will hide some who fear to tell their patients the true state of affairs. There are others who have deluded themselves and will doubtless continue to do so with the belief that this is the actual pathology with which they are dealing. Probably much of this has come from the knowledge that calculi are the end results of the infection with the result that we are ceasing in our attempts to diagnose gall-stones and satisfying our consciences with the diagnosis of gall bladder infection.

A successful culture of bacteria from bile in these so-called chronic cases is not in our opinion sufficient to verify the diagnosis as our observation has been that in chronic cholecystitis there are definite changes in the gall bladder walls whereas the bile itself may or may not (and often does not) contain micro-organisms. The changes in the gall bladder walls present the same characteristics as inflammatory changes do elsewhere in mucous membranes and if the gall bladder is subjected to drainage pure and simple an ultimate cure does not result. It is in this type in which may be included the so called strawberry gall bladder of Mayo and Moynihan that cholecystectomy is necessary to secure permanent and complete relief and this is one of the points to which I would direct particular attention. If prolonged drainage of the cholecystochous tract is necessary then after removal of the gall bladder it is an easy matter to suture a tube in the remains of the cystic duct or into the common duct and secure drainage for such length of time as may be desired.

In cases of acute cholecystitis by which is meant an acute infection accompanied by pus formation frequently invading the gall bladder wall and communicating with the peritoneal cavity the gall bladder itself being more or less gangrenous in certain areas particularly about the fundus the entire viscus being isolated from the general peritoneal cavity by omental adhesions—we do not advise nor do we practice removal of the gall bladder. We are convinced

that in this type complete separation of the adhesions is undesirable and are of the opinion that the best results are obtained by carefully separating the omental wall from only such an area as will permit access to the gall bladder for the purpose of drainage. We cannot by any technique protect the general cavity as well as does Nature with the omentum or loops of intestine by which she provides a barrier to prevent extension of bacteria and our aim should be to interfere with this barrier as little as possible. Short incisions through the abdominal wall should be the rule in such cases, and it is unimportant whether or not calculi may be present in the gall bladder. The primary object is to afford drainage and at the same time to prevent further spread of bacteria and their product which can best be done in the manner described. If calculi are present we can perform a two-stage operation but we are convinced this is not the type of case in which to practice total removal of the viscus.

Cholecystectomy is directly in the forefront at the present time and its exact status has yet to be determined. Just what may be the preponderance of opinion and what may become the final practice as to disposition of the gall bladder I would fear to say. With us it has seemed that it is not so much a question of whether gall bladder to remove as which one not to remove. The negative side of the question is the one which requires the exercise of greater judgment.

Before leaving the subject of cholecystectomy we would express the further opinion that in all cases where calculi have for any considerable time been resident in the cystic duct the duct and gall bladder should be removed.

According to the views of W. J. May, while cholecystotomy may be an efficient procedure in gall stone disease when the gall bladder is otherwise normal and the ducts are free in cholecystitis the method is not satisfactory. A gall bladder which can keep up continuous trouble from infection alone without the mechanical irritation of gall stones will probably not be cured by simple drainage and cholecystectomy will be the procedure to follow. As a matter of fact cholecystectomy is now largely indicated in gall stone disease and it may be said that practically all cases of cholecystitis and the large majority (probably 80 per cent) of cases of gall stone disease should be treated by cholecystectomy rather than cholecystotomy.

The other type of cases to which we desire to call attention is that in which calculi are present in the common duct producing more or less con-

tinuous complete obstruction. If the obstruction is acute there is practically but one opinion as to the surgical course to be pursued but if the obstruction is chronic if cholangitis has supervened if the infection has extended to the bile ducts of the liver we think the procedure to be followed is open to much discussion.

Crile has again recently called attention to the high lethality rate in these cases and all who have had much experience in this class of work know that the mortality is out of all proportion to the surgery of other parts of the body and in almost any other pathology. So far as can be ascertained it is from 10 to 25 per cent and Kehr even at one time placed it as high as 50 per cent. The mortality has been markedly lowered through anoxia and the administration of nitrous oxide gas. Crile expresses the belief that many of these patients die as the result of trauma to the nerve supply of the liver and to further disturbance of its function. He makes the further point that with the liver damaged as is certain to occur in these cases the administration of a lipid-soluble anesthetic is absolutely contraindicated and in this we heartily agree.

We would offer a further explanation of the fatality in these cases aside from that due to sepsis the sudden release of the intrahepatic pressure due to rapid emptying of the overdistended biliary tract. We have here a condition quite analogous to that in the kidneys of old prostatitis. The sudden release or distention in intrahepatic pressure permits a tremendous influx of arterial and portal with an accompanying stress of such an extent upon liver cells already damaged that their metabolic function becomes impossible. Poisonous material is thus retained and absorbed into the blood and as a result death ensues.

Our own operative work in recent years particularly during the last two and one-half years since we have familiarized ourselves with the anoxia association method has been performed under gas-oxygen anesthesia and complete blocking containing ourselves with preliminary drainage of the gall bladder and dividing the operation into two stages. After the gall bladder has been permitted to drain for some time and the patient's temperature has receded to normal and the jaundice has subsided we then do a secondary operation removing the obstruction from the duct. We are sure that under this plan the mortality has been materially reduced and we would offer this suggestion to those who have not yet tried the method.

PRIMARY RESULTS OF RADIUM TREATMENT IN UTERINE AND RECTAL CANCERS

WITH A REPORT OF TWENTY THREE CASES

BY HENRY SCHMITZ, A.M. M.D. CHICAGO

ON April 1, 1914 I obtained fifty milligrams of radium element in the form of radium barium sulphate 60 per cent pure. The radium is inclosed in equal parts in two glass tubes 13.8 by 2.9 mm and 13.15 by 3 mm respectively and these tubes are placed into two Dominici silver capsules. The walls of the silver tubes are 0.5 mm thick. Besides these two silver tubes I have a larger one the walls of which are also 0.5 mm thick and in which I can place both glass capsules if I wish to use the entire amount of radium element in a given case.

Upon the receipt of radium element I began to treat uterine cancers immediately. I must thank Professor A. J. Ochsner for placing at my disposal the greater part of the chemical material reported here. The technique used consisted at first in the application of 50 mg. of radium element for ten to twelve and later for forty to sixty hours repeated at first every four days and later every eight to ten days. The α rays and β rays were excluded by lead or brass filters over which a rubber cot was drawn to exclude the secondary rays. The applications were continued until a marked improvement occurred in the local as well as the constitutional condition of the patient. Most of the patients had inoperable uterine cancers or recurrent cancers after operations.

The radium treatment of most of the cases of inoperable primary cancer of the uterus was preceded by a cauterization of the uterus with the actual cautery. The radium was applied as soon as the condition of the patient permitted. If after applying radium the uterus became freely movable and the infiltrations in the parametria disappeared an abdominal panhysterectomy was performed. In some of the cases tissues were removed for microscopic examination in others this was not done. In all the cases operated on after radium treatment the removed tissues were carefully examined by the microscope. In this connection I wish to state that I treated with radium every case of uterine, vaginal or rectal cancer referred to me regardless of the local or constitutional conditions present. This I did to study the local action of radium under all conditions. In all

of the cases the radium treatment was combined with massive X ray applications. The rays were applied through the anterior abdominal wall according to the principles of the Kroonig Gauss massive filter method. They were given in sessions of six daily treatments with an intermission of two weeks. About 50 to 60 x of rays were applied daily. Whether the X ray treatment favorably influences the metastatic cancers and distantly located cancer-cell nests I cannot state but I am inclined to believe that the X rays are more useful in conjunction with radium treatment than if used alone. As a matter of fact I have never seen a uterine cancer that was favorably influenced by the application of massive X rays unless some other therapeutic measures were used in combination with the same.

Chemotherapy has not been employed in the treatment of my cases. However I am firmly convinced of the correctness of its principle and will in the future combine radium treatment with chemotherapy.

It is needless to state that every operable case of uterine cancer was immediately subjected to a radical operation and afterwards to radium treatment. I coincide with the opinions of Foveau de Courmelles, Duval, Wickham and Degrais who state that radium and X rays should not be antagonistic to surgery but should become its adjuncts. In fact they insist on a new branch of surgery, a radium surgery where one agent supports the other as a given case might indicate. Every uterine cancer subjected to an operation was treated afterwards with radium and X rays in order to destroy all the cancer-cell remnants which might have been left behind. These latter cases are also included in this report though the time is really too short to permit of any practical deductions.

The side actions of radium have been marked in some cases in others they were entirely absent. The symptoms most commonly complained of were a burning sensation in the bladder or rectum at times increasing to an actual tenesmus, vomiting and nausea, diarrhoea, loss of appetite, severe nervousness, loss of weight and hyperpyrexia. The loss in weight seemed to be very marked in all the cases so that

the patients apparently failed under treatment. In Case 7 reported below an endocarditis existed when the patient was admitted. This grew rapidly worse under radium treatment so that the patient succumbed almost suddenly. The suggestion has been made that the endocarditis might have been a symptom of a general cancer disease—a carcinomatosis. In most of the cases a reaction occurred within two or at the latest within three weeks. It appeared as if all the side actions had subsided at least the patients ceased complaining the appetite returned and with it a gain in weight strength and general health. The immediate beneficial effects of radium applications consisted in a disappearance of the characteristic putrid odor the pyorrhoea changed to a slight thin watery discharge and the hemorrhages were wholly arrested. These facts explain the remarkable influence which radium treatment exerts on the disposition of the patients. They change from downhearted listless moribund beings to healthy looking life-enjoying people full of the rosiest hopes for a bright future.

In the following paragraph I shall enumerate the cases of inoperable primary cancers of the cervix. The cases of cauliflower cancer were subjected to an excochleation with cauterization. As soon as the patients recovered from this operation they were treated with radium. In two cases in which the cancer was of the ulcerative form radium treatment was begun immediately without excochleation.

CASE 1: Mrs L. W. age 35 married 7 years 0 para Augustana Hospital, No 39,469 admitted March 9, 1914 referred by Dr. A. J. Ochsenr. Clinical diagnosis: Carcinoma cervicis uteri. Microscopic diagnosis: Carcinoma.

Treatment: March 30, 1914 Cauterization with actual cautery. April 1, 1914, application of calcium carbide. April 5, 9, 4, 5 mg radium element in 3 mm lead filter into crater of cervix—4.5 mg hours. April 7, 1914 cancerous odor had disappeared, discharge lessened 50 mg radium element in 3 mm lead filter were applied—550 mg hours. April 12, 1914 discharge had stopped entirely. Crater was dry; 50 mg radium element in 3 mm lead filter—550 mg hours. April 16, 19, 4, 5 mg radium element in 3 mm lead filter—575 mg hours. April 20, 1914 50 mg radium element in 3 mm lead filter—550 mg hours.

The patient received 3,000 mg hours radium element. The vagina was covered with healthy looking granulations. The patient felt subjectively much improved. Cough delirium, pyrexia and also odor and discharge had disappeared. On April 26, 1914 the uterus was found freely movable the crater dry. The patient felt objectively well. On her return June 1, 1914 she was free of all pain, had a scanty colorless and odorless discharge had not had any hemorrhages, although she menstruated for three days. On May 13, 1914, she had gained ten pounds in weight, felt stronger and was much brighter mentally. The uterus was freely movable. An indurating band involved the left adnexa. Fifty milligrams of radium ele-

ment were inserted in mm lead filter from 8:30 a.m. to 7:30 a.m. June 4, 1914. It told 350 mg hours. As the uterus became operable now I freely movable an abdominal panhysterectomy was performed by Dr. A. J. Ochsenr. The uterus was removed without difficulty. On the left side the patient had hydrosalpinx. The microscopic examination revealed necrotization of all cancer cells. Not a single active cancer-cell was found.

Patient received 2,000 mg hours on June 30, 1914, the radium being inserted directly between the stumps of the broad ligaments. She now feels subjectively well, has no pain, sleeps well and gains constantly in weight and strength. She returned to the hospital on July 3, 1914 complaining of a great deal of vesical tenesmus. Examination was negative except that firm induration could be palpated round the vaginal stump. The crater seemed to be lined with white membrane. Another 1,000 mg hours of radium was given. During this radium treatment the patient received as stated above from 00 to 120 massive X rays every three weeks and also on her return to the hospital, June 29th and June 31st. Soon after returning home an unbearable pain was felt in the bladder. The patient had been morphine user and resumed the use of the drug. She soon became bedridden, mentally cloudy and developed symptoms of involvement of the bladder and has since succumbed. This patient never manifested any secondary effects from the radium treatment.

CASE 2: Mrs Th. age 65 married 1 para referred by Dr. A. J. Ochsenr. Clinical diagnosis: Carcinoma cervicis uteri et vaginae. Microscopic diagnosis: Squamous cell cancer of the cervix.

Treatment: March 6, 1914 uterine curettage and cauterization of cervix with actual cautery. Microscopic examination: I curetted tissues shows squamous cell cancer. April 3, 9, 4 examination reveals mass of ulcerations including 4 tons vestibule, on inner surface of labia minora. The patient was given 500 mg hours with 25 mg radium element in 3 mm lead filter introduced into crater of cervix. Microscopic examination of excised piece of tissue shows squamous cell cancer fibrous tissue, and lymphocytes. April 7, 1914 discharge is very much less cancerous odor till marked, and 575 mg hours with 50 mg radium element in 3 mm lead filter were applied. April 12, 1914, 625 mg hours were given. Odor now absent. April 16, 1914, 650 mg hours were given, making a total of 445 mg hours. On examination the uterus was found freely movable the vagina healthy looking, the crater dry. Indurations within the parametrium could not be palpated the cervical crater seemed to be surrounded by a mass of firm tissue. April 24, 1914 uterus and adnexa were removed. Microscopical examination of polypus removed from fundus ten did not show malignancy. The tissue from cervix showed areas of marked malignancy others arrest of growth shown by fibrous surrounding the cancer-cells and marked flattening of the latter. The cells show marked karyolysis. May 30, 1914 600 mg hours were given in 50 mg radium element in 3 mm lead filter. May 9, 1914 700 mg hours. Patient left hospital and returned July 9, 1914. She had gained ten pounds weight and felt subjectively entirely well. Bimanual examination was negative. Vaginal polypus 2,000 mg hours radium element in 5 mm brass filter the opening in the stump of the vagina having contracted so that it would not permit the use of the larger lead filter. On August 1, 1914 the patient had gained ten pounds, felt perfectly well and was doing her own housework. Another 675 mg hours was given with 5 mg radium element in 3 mm lead filter. The vaginal vault was perfectly smooth but covered with whitish membrane.

This patient also received every twenty-one days a

séance of six sittings of massé e X rays while in the hospital, but not o her returns July 1 1914 and August 1 1914 On September 9 9 a patient reported for examination She had continued to gain in weight and was free of all distress Examination was negative We applied 600 mg hours of radium element in 3 mm lead filter Up to the present patient has received a total amount of 7.9 8 mg hours radiu element Secondary effect of the radium treatment wer not observed

CASE 3 Mrs E M ge 51 I para widowed St Mary's Hospital No 35 957 admitted M ch 7 9 4 Clinical diagnosis Carcinoma portiois vaginalis inoperabile Microscopic diagnosis Squamous cell cancer

Treatment M ch 3 9 4 extochleation and cautization with actual cautery April 4 1914 25 mg radium element in 2 mm lead filter inserted; to crater of cervix—500 mg hours April 8 914 50 mg radium element in 3 mm lead filter—575 mg hours April 11 914 50 mg radium element in 3 mm lead filter—675 mg hours April 5 914 5 mg radium element in 3 mm lead filter—575 mg hours April 9 1914 50 mg radiu element in 3 mm lead filter—550 mg hours April 9 1914 50 mg radium element in 3 mm lead filter—550 mg hours

Patient developed severe almost uncontrollable diarrhoea and rectal tenesmus with apid loss of weight The radium and X ray applications were therefore discontinued until May 9 1914 when there was inserted 50 mg radium element in 3 mm lead filter—100 mg hours May 4 19 4 50 mg radium element in 3 mm lead filter—650 mg hours May 9 914 5 mg radium element in 3 mm lead filter—600 mg hours May 7 9 4 50 mg radium element in 3 mm lead filter—600 mg hours June 4 9 4 50 mg radium element in 3 mm lead filter—600 mg hours June 1 1914 50 mg radium element in 3 mm lead filter—400 mg hours This made a total of 3.375 mg hours

After the first three applications the profuse putrid discharge disappeared July 914 the subjective condition of patient was normal except that she felt fullness in the rectum as if it was markedly constricted. The discharge and odor had ceased she had no pain or hemorrhages The uterus was palpable and freely movable A hard uniform mass felt in the base of the left parametrium The rectum was free of any nodulations An abdominal hysterectomy was performed July 4 914 The recovery of the patient was uneventful The uterus did not offer any resistance during removal The microscopic examination did not reveal any cancer cells or carcinoma, but fibrous of the uterus and trophic changes only

July 20 9 4 5 mg radium element in 3 mm lead filter—05 mg hours July 3 19 4 50 mg radium element in 3 mm lead filter—950 mg hours July 7 19 4 50 mg radium element in 3 mm lead filter—100 mg hours The total amount of radium element applied was 1.375 mg hours August 19 4 the patient returned complaining of distention of the abdomen rectal tenesmus obstruction of the rectum loss of appetite and decrease in weight and strength Her husband was pale and anemic The pain necessitated the use of opiates October 9 9 4 the physician reported he very weakened condition, bedfast and failing steadily Apparently there is no involvement as for several weeks he has had very persistent diarrhoea that carries tools She had one vaginal hemorrhage about one month ago and has constantly crid foul-smell g discharge not treated with blood

CASE 4 Mrs S ge 56 married I para climacteric carcinoma Present illness 5 years ago was taken ill with irregular hemorrhages putrid discharges from

vagina and unbearable backache On examination the entire uterus was found a mass of breaking down tissues The case at the time was diagnosed as an inoperable carcinoma June 8 1910 extochleation and cautization of uterine cavity was performed This was followed by repeated applications of a 50 per cent aqueous solution of zinc chloride One year afterwards another cautization was done on account of severe uterine hemorrhages August 913 patient noticed a recto uterine fistula and in November 9 3 a left hypogastric colostomy was performed This was followed by the application of massive X-rays During the following three months the patient gradually lost in weight and became cachectic until April, 19 4 when radium treatment was begun

April 4, 19 4 the examination reveals a crater extending into the body of the uterus profuse hemorrhages putrid discharges rectal bleeding from right side of crater at slightest touch Clinical diagnosis Carcinoma corpus uteri inoperabile with extension into anterior rectal wall and posterior bladder wall April 4 9 4 5 mg radium element in 3 mm lead filter—500 mg hours April 8 1914 25 mg radium element in 3 mm lead filter—500 mg hours April 11 19 4 50 mg radium element in 3 mm lead filter—500 mg hours

The discharge is very much lessened the odor has almost entirely disappeared and bleeding has ceased April 5 19 4 50 mg radium element in 3 mm lead filter—5 mg hours April 9 19 4 50 mg radium element in 3 mm lead filter—600 mg hours April 22 1914 50 mg radium element in 3 mm lead filter—565 mg hours April 28 19 4 50 mg radium element in 3 mm lead filter—5 mg hours May 3 914 5 mg radium element in 3 mm lead filter—500 mg hours May 7 9 4 50 mg radium element in 3 mm lead filter—450 mg hours May 11 1914 50 mg radium element in 3 mm lead filter—500 mg hours May 16 19 4 50 mg radium element in 3 mm lead filter—700 mg hours May 20 9 4 50 mg radium element in 3 mm lead filter—450 mg hours May 27 914 50 mg radium element in 3 mm lead filter—575 mg hours June 4 914 50 mg radium element in 3 mm lead filter—575 mg hours June 17 914 50 mg radium element in 3 mm lead filter—850 mg hours

At first the patient lost rapidly in weight and strength but very soon regained both June 10 1914 the patient felt subjectively perfectly well had gained considerably in weight and commenced to perform all her own household duties Two weeks prior to October 5 9 4 the patient began to lose all she gained under the radium treatment The uterus has practically laughed away the mass; the rectum is the size of an orange and a recto-vaginal fistula has formed She is rapidly losing weight and beginning to show a cachexia Pain constant requiring opiates for relief The total amount of mg hours of radium element used this patient was 8.3 X ray applications were not given

CASE 5 Mrs J McC ge 47 married I para St Mary's Hospital No 24 096 admitted M ch 7 19 4 Diagnosis Carcinoma cervix ten involving parametria, anterior rectal wall Microscopic diagnosis Squamous cell cancer

Treatment M ch 9 9 4 extochleation and cautization with actual cautery Patient received up to date about 800 massive X rays April 4 914 50 mg radium element in 3 mm lead filter—600 mg hours April 18 9 4 50 mg radium element in 3 mm lead filter—550 mg hours April 3 19 4 50 mg radium element in 3 mm lead filter—600 mg hours Patient now feels subjectively perfectly well and in spite of continued requests objects to be further treated

June 7 9 4 patient returned complaining of profuse

mination October 20 1914. The vaginal canal is covered with a white membrane shaggy in place. General condition continues to be satisfactory except that in my opinion he has lost some in weight and strength. An examination made November 6 1914 reveals a vesico vaginal fistula in element of bladder gradually increasing cachexia.

The immediate results of radium treatment were remarkable and coincide with those reported by other investigators in the same field. However the marked improvement the subjective cure as the Germans call it is only temporary. Whether this temporary cure is greatly influenced by the fact that all these cases were operated if they became operable is doubtful. I adhere to the principle that a cancer must be treated surgically if possible and followed by radiotherapy which latter becomes a valuable adjunct to surgery. Case 2 is the only one in this series that seemingly is clinically cured. However the time is too short to call the result a permanent; it is an anatomical cure. Cases 8 and 9 are too recent to permit of any conclusions.

In the following paragraphs I shall discuss six cases of recurrent cancers of the uterus.

CASE 2 Mrs. A. McC. age 39 para admitted March 3 1914 referred by Dr. J. J. Ochsner August 11 1914. Patient had hysterectomy last fall but the wound never healed. She has continued malodorous watery and bloody discharge from the vagina and frequent micturitions. Diagnosis: Recurrent teratoma of the entire vagina and perineum.

Treatment: Int. venous injection of 6 curies perineal area April 5 1914 50 mg radium element; 3 mm lead filter and rubber cot were inserted the vaginal canal—100 mg hours. May 9 1914 same to perineum—50 mg hours. May 16 1914 same to vagina—50 mg hours. May 24 1914 same to perineum—500 mg hours making total of 5375 mg hours.

Caerous odor and profuse discharge disappeared after the first treatment. After the third treatment a high continued temperature appeared with all the symptoms and signs of a general toxemia. The patient died.

CASE 3 Mrs. A. M. age 35 para admitted April 1 1914 referred by Dr. N. M. Percy Augustana Hospital 1 3987.

Diagnosis: Cancer of rectum involving posterior vaginal wall and anal region. A microscopic examination of tissue reveals adenomatous papilloma in lymph.

Treatment: June 1 1914 5 mg radium element 3 mm lead filter to rectum—50 mg hours. June 5 1914 5 mg radium element 3 mm lead filter to rectum—75 mg hours. June 12 1914 5 mg radium element 3 mm lead filter to rectum—600 mg hours. June 19 1914 5 mg radium element 3 mm lead filter to rectum—200 mg hours.

Patient received 7600 mg hours of radium element without any improvement following the subjective condition did not change. August 17 1914 50 mg hours radium element in 3 mm lead filter to rectum—600 mg hours. August 24 1914 50 mg radium element 3 mm lead filter to rectum—700 mg hours. The additional 300 mg hours also were not productive of any changes. The treatment was discontinued.

CASE 14 Mrs. K. age 38 referred by Dr. D. A. Orth St. Mary's Hospital 1 24058. Diagnosis: Recurrent cancer of uterus involving vagina and posterior wall of bladder. Microscopic diagnosis: Squamous cell cancer.

History: In 1912 patient had a circular amputation of cervix. January 9 1913 an abdominal hysterectomy and September 6 1913 a vaginal cauterization for cancer of the cervical stump. She was admitted to the hospital March 3 1914 on account of profuse vaginal discharges hemorrhages and severe abdominal pain and rapid loss of weight and strength. Examination revealed an involvement of the entire vaginal wall in portions of bladder rectum and some portions of the posterior fourchette. Patient was profoundly cachectic.

Treatment: April 6 1914 50 mg radium element 3 mm lead filter to vagina—500 mg hours. April 10 1914 50 mg radium element 3 mm lead filter to vagina—600 mg hours. April 14 1914 50 mg radium element 3 mm lead filter to vagina—57 mg hours. April 17 1914 50 mg radium element 3 mm lead filter to vagina—600 mg hours. April 23 1914 50 mg radium element 3 mm lead filter to vagina—500 mg hours. April 27 1914 50 mg radium element 3 mm lead filter to vagina—525 mg hours. May 8 1914 50 mg radium element 3 mm lead filter to vagina—50 mg hours making total 15700 mg hours.

Patient did not improve at first except that the discharge odor and bleeding disappeared entirely. She had secondary symptoms. However in the latter half of June her subjective condition improved rapidly her strength returned the pain disappeared entirely and she began to be up and about. During August a large vesico vaginal fistula formed. The patient rapidly died and returned to her former desolate condition. She died September 1914.

CASE 5 Mrs. C. P. age 63 married referred by Dr. J. J. Ochsner Augustana Hospital 1 2470. Clinical diagnosis: Recurrent cancer of the vagina.

Treatment: June 3 1914 50 mg radium element 3 mm lead filter to vagina—575 mg hours. Patient did not return for any further treatments. Inquiry by mail unanswered.

CASE 6 Mrs. A. H. age 63 para Augustana Hospital No. 4077 referred by Dr. Ochsner. One of the laboring time seven years ago it took five years to married life. Patient never had a menstrual disturbance. History: Four years ago agonal panhysterectomy began cancer of cervix after patient had had bloody discharge from vagina for about one week. June 10 1914 patient noticed a general weakness and July 1 1914 profuse leucorrhoeal and bloody discharge from vagina. Diagnosis: Recurrent cancer of the cervix with vaginal wall size of pea.

Treatment: July 23 1914 5 mg radium element 3 mm lead filter to vaginal canal—3600 mg hours. July 3 1914 cauterization of ulcer with actual cautery. August 5 1914 50 mg radium element 3 mm lead filter—3400 mg hours.

Patient did not feel any worse from the treatment except that he seemed to be somewhat weakened and dependent on had profuse watery discharge from the vagina. During the latter part of August 450 mg hours radium were applied by Dr. Abbe New York while patient was in the East because she had noticed an increase in watery discharge. September 7 1914 50 mg radium element 3 mm brass filter was applied. November 1 1914 vaginal scar the size of a pigeon's cornea was still present. October 6 1914 500 mg hours of radium element 3 mm brass filter were applied. November 1 1914 had disappeared. Patient felt no ill effects.

of the rectus (outer 1/3) then free it from the transverse fascia and make the incision through the external oblique and the internal oblique and the transverse fascia. The transverse separation of the transversalis muscle of the abdomen can be from three to four inches in length and can be easily extended up and down. No other incision is necessary but the incision is made from the umbilicus down.

Its advantages are: 1. It is free from any danger to the liver, gall bladder, and duct.

2. It does not involve any of the transverse vessels.

3. Most important of all it can be very easily closed.

4. It should hold the hernia in place after the operation.

5. It is the best of all for the operation of a hernia.

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40. It is the best of all for the operation of a hernia.

to the Southwest Medical Society at Oklahoma City, October 11, 1912.

I desire to say a word in favor of the oblique Kausch incision and the transverse incision of Spigel which is made at any level desired according to the case. These incisions are entirely sufficient for simple cases involving the gall-bladder, cystic or common ducts. They afford ample exposure, are easily closed and practically do away with any operative hernia.

I think the most complicated cases and especially cases previously operated upon through a vertical incision Czerny's *"Winkelschnitt"* as modified by Kehr is a fixed. This is a right angled incision.

A vertical cut in the median line connects with a transverse incision extending to the right costal margin. Czerny extended the vertical part of the incision to the navel although Kehr has pointed out that it is not necessary to go so low as the navel. This incision saves time and trouble in complicated cases for it exposes the entire biliary area from the free peritoneal side.

All of these incisions are adequately dealt with by Kehr's Spengel work is more fully discussed in the *Archiv für klinische Chirurgie* 1910.

JOHN C. SUTTON, M.D.

K. A. C. M. S. O. N.

To the Editor

Your letters received with enclosures from Dr. Southern and Sheldon.

I put to you the original copy of a letter written to Dr. Southern January 15.

Let me think you for sending me a marked copy of the *Lancet* (Jan. 1 December 21 1912).

I am very much interested in the article which is absolutely in agreement with my experience with the incision. I must congratulate you on being the first in print with the same.

I will endeavor to find for you a reprint of an article of mine written in May 1894 which antedated by three months McBurney's publication of the muscle splitting proposal and recommendation of the use of the muscle-splitting method.

A applicable to many situations in the abdomen gall bladder, kidney, appendix, artificial anus, etc.

Unfortunately the Chicago Medical Society failed to publish my article until November and McBurney secured the credit by publishing in July of the same year.

I note from Dr. Sheldon's letter that he claims priority over Dr. Southern by nearly ten years.

Chicago I. I. McARTHUR, M.D.

Best, Mrs. Chas. E.

Arch. of Clin. Chir.

Chirurgie des Gallenwege 20 3

The best article I have seen in Incision for Gall Bladder was by Dr. R. I. Larr of Minneapolis in which he speaks of a transverse incision but this is not a gridiron incision. His article was published prior to mine.

CHARLES I. SUTTON, M.D.

C. I. Sutton

To the Editor

In the January 1913 issue of the SURGERY GYNCOLOGY AND OBSTETRICS Dr. I. I. McArthur describes an incision for certain gall bladder operations which consists of a vertical division of the skin and structure down to the posterior surface of the rectus and a separation of the posterior layer of the internal oblique and the transverse parallel to their fibers nearly transversely.

In 1904 I used this incision and learned that the vertical incision of the skin and external oblique could be dispensed with.

So I began making a nearly transverse incision incising the skin parallel to the direction of the fibers of the external oblique separating the fibers of the external oblique and transversalis as recommended by Dr. McArthur and when necessary dividing the rectus transversely.

This is the incision described by Kausch. I presented it with its modifications and extensions

to the Southwest Medical Society at Oklahoma City, October 11, 1912.

I desire to say a word in favor of the oblique Kausch incision and the transverse incision of Spigel which is made at any level desired according to the case.

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TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING DECEMBER 18 1914 WITH THE PRESIDENT DR ROBERT T GILLMORE IN THE CHAIR

EXHIBITION OF SLIDES

DR RUDOLPH W H LAR I have here a uterus with a uterine polyp which caused some difficulty in the differentiation between the actual pathology and the pregnancy. Three years ago this month I removed four small subserous fibroids and corrected retroversion by the so-called Andre Webster operation. Recovery from the operation the patient was symptomatically all until she went home where she was sorely distressed by pudendal pain. After topical treatment and the application of the various provoking factors she was relieved. The account of the course of the tumor origin. The uterus at this time was small, firm, and in the vagina recently. She had ended her profuse menstruation for some months. At this time her uterus was the size of a four-month pregnancy, soft in consistency, and globular. The diagnosis of mucous fibroid having been made a hysterectomy was planned. At the time of operation preliminary curettage was done for the purpose of rendering more perfect toilet by clearing the uterus of the case of leucorrhoea. It was easily possible to explore the uterine cavity with the finger—the entire uterine wall was uniformly thick and greatly hypertrophied although the posterior wall near the fundus was roughened. A dividing the right membrane was pulled perhaps three inches below the level which had some appearance of decidual membrane. It was thought expedient to postpone before removing the uterus, the possibility of the base of the final history of pregnancy which might have been the case, as I have seen many cases of greatly hypertrophied uterus containing molar pregnancies which have resembled this case.

The curettage as done on Tuesday the following Monday on account of some slight uterine sanguinolent discharge I ordered small doses of ergot. Promptly thereafter she began to have severe epigastric pains of an adynamic character. These pains continued intermittently till Wednesday when Dr. W. H. Lar. was good enough to see her with me and corroborated the opinion that the operation should not be deferred. The next afternoon I did the paravaginal hysterectomy. The operation was difficult as the uterus and bladder were covered by broad firm testicular adhesions which were separated with some considerable trouble.

On opening the uterus we found a large submucous fibroid which had its site on the upper posterior wall; it just touching the internal os. One may see surrounding this base of the tumor a dense fibrous layer the capsule which undoubtedly was broken by the curettage and then the morse was extruded by the contraction stimulated by the ergot. I might add that the membrane pulled before the previous operation fibrous tissue thickly infiltrated with lymph cells which could not be recognized decidual cells.

The second specimen I shall show is that of ruptured

appendix removed the fifth month of pregnancy. In itself the appendix does not offer anything unusual except perhaps the presence of the large enterolith (nearly a quarter of an inch diameter). The woman was twenty-eight years of age when fourteen she had a severe attack of appendicitis which was treated expectantly and she has not had another attack these fourteen years. Her last menstruation was on June 26. On Sunday, November 3, after her usual dinner she was seized with vomiting which recurred two or three times in the next few hours. Shortly after the first onset she had a localized pain in the epigastric region. Temperature was evidenced then and only on the third day she would not countenance any being called as she felt that it was a stomach attack due to pregnancy which, while not usual with her had occurred on previous occasions. Monday morning the epigastric pain had subsided, but some more meninges of tenderness or rigidity at any point of the abdominal wall. Tuesday morning at ten o'clock the pain transferred to point of the right iliac fossa. I saw her at eleven o'clock and sent her to the hospital. Her blood count was 16,000.

The cecum was delivered through a small incision and the appendix easily removed. The appendix had practically no meso-appendix; the control of bleeding was more than ordinarily difficult account of the friable tissue. While removing the appendix it ruptured and the tone was vitiated. There was no junction of the cecum or adjacent peritoneum. On account of the rupture a cigarette drain was placed at the wound closed. For two days her convalescence was usually calm no pain or discomfort of any kind. On Thursday she was given an enema with return of mere fecal matter. For the next seven days no bowel movement was secured, nor did she pass gas though she had frequent attacks of belching. For nine hours on Saturday she had some pain. The bowels were tympanitic but soft. On the eighth day after the operation she screamed with pain or any discomfort. During this time she held she had an adynamic state. On the ninth day after the operation she suddenly began to have bowel movements, no passed much gas. From then on her convalescence was marked. On the fifteenth day she was sitting up in bed, and had her first fast of solid food small piece of milk toast. Shortly after taking the milk toast she was seized with pain which continued until the third day then it became rhythmic the tympany receded and by evening it was determined she had a normal dynamic ileus. The abdomen was opened in the midline. The peritoneum was nicked there was a gush of gas audible to all in the room. On entering the abdomen collapsed bowel was found adherent to the mesentery over the cecum long undoubtedly as could be pressed. The abdominal wall was removed with the parietal tendons actually exploded. Some delicate adhesions were separated relieving the kink and reducing the tenderness.

of the rect (outer border) then free
 the sacral fascia and make a
 around and make the incision
 and paritoneum of the incision
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 versal muscle of the fibers
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 of the sacral fascia and the

It is free a transverse larger
 of the gall bladder and duct
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 the costal chora and the rectum
 If it is not possible to do so
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 It would hold the incision
 the pre-entention of the operation
 that the incision does not
 It makes the operation
 the operation easy and safe

6 When the usual method
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 possible percent of the cases and
 I have found that the
 gained by this slight change
 the incision will be good enough
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 caused in any of the cases
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 can need that one who will
 use it often

The best article I have
 Gall Bladder was by Dr J
 apoli in which he speaks
 of it but this is not a good
 article was published prior to

CHARTER I

CHARTER I

To the Editor

In the January 1915 issue of
 the *Colorado Medical Review* Dr
 describe an incision for colic
 operations which consists of
 of the skin and structures down
 surface of the rectum and a
 posterior layer of the internal
 transverse parallel to the trans-
 versely. In 1903 I used this incision
 that the critical division of the
 oblique could be dispensed with
 making a nearly transverse incision
 skin parallel to the direction of
 external oblique separating the
 external oblique then dealing with
 oblique and transverse as for
 Dr McArthur and when not
 the rectus transversely

This is the incision described
 presented it with its modification

a picture of just about the same sort of monster. The obstetricians were considering the question of operating at that time. The children were both alive. Afterwards I think they did operate but what the outcome was I have forgotten.

DR DORLAND The case just referred to by Dr Heaney was that of Bandoun the babies are still united and living.

DR HENRY F LEWIS I was particularly struck by the appearance of the radiogram of the specimen of acephalus dipus. The picture was only recently taken and I had not examined it before today. As you will notice there is distinctly a cranium of fair capacity and a set of cervical vertebrae which constitute even an abnormally long neck although there seems to be no trace of arms or shoulder girdle. Therefore this is really not a specimen of acephalus rather is it one of amelus abraclius with excessive development of connective tissue which covers and conceals the head.

Ordinarily acephali have nothing above the level of the top of the sternum except the excessive amount of integument and subcutaneous connective tissue. Usually also they have no heart but depend for circulation upon the heart of the dominant twin.

DR ARTHUR CURTIS One time I was interested in monsters and spent some three or four months in attempting to make a classificational study of the cells of the spinal cord. At the time when one finds the absence of a certain group of muscles or of one or more extremities there is also an absence of the corresponding cells in the horns of the spinal cord. Inasmuch as the localization of these various centers is not as yet well established I would suggest that if it were possible to remove these spinal cords to study the horn cells, it would be of considerable interest to neurologists.

DR DORLAND (closing) I did not see the X-ray picture referred to by Dr Lewis until today. I think with him that we should make a study of these monsters anatomically and if Dr Lewis who now has charge of these specimens has no objections such an examination will be made. It is interesting to note in the so-called acephalic monster the presence of the bones of the skull. In no place have I found reference made to such a condition. I have made but a superficial search having had only a few days in which to prepare this paper however I covered the literature for fifteen years and I think I secured all the essential data. In no instance has a skull been mentioned in this variety of monster and I believe that this is a unique specimen. The

thorax is usually empty or contains but rudimentary organs. Sometimes the heart may show a fairly good degree of development.

OVARIAN TUMORS IN PREGNANCY

DR W C DANFORTH read a paper entitled Ovarian Tumors in Pregnancy with a Report of a Case of Solid Tumor (See p 319)

DISCUSSION

DR THOMAS J WATKINS This Society has taken up this subject rather recently with the paper Dr Barrett read and then in a joint meeting with the Philadelphia Obstetrical Society. It seems to me that it would be inadvisable to have a routine treatment for these cases. I believe the plan of procedure should be very largely a question to determine in each individual case depending upon numerous facts which are too numerous to take up here and which are familiar to you all. I would be rather inclined to think it would be unwise to remove an ovarian cyst as soon as found. The ideal method in suitable cases is to let the pregnancy go on to term and remove the cyst and do cesarean section at the same time. Dr Danforth spoke of removing the tumor and then doing a cesarean section. It seems to me it would be very much more advisable to do the cesarean section and then remove the tumor in order to facilitate the operative technique. It seems to me that the statistics in a subject like this are apt to be very inaccurate as there is a great tendency to report favorable and not to report the unfavorable cases. The statistics of this work prior to fifteen years ago are of very little value as abdominal surgery has advanced much since that time.

DR RUDOLPH W HOLMES I know we all face the thought when we have a pregnant woman who needs some abdominal surgery. Will the operation cause a miscarriage? I believe the statistics which present certain figures as the liability for miscarriage for particular lines of surgical intervention are specious. After long study of the abortion situation in the years I was on the abortion committee of the Chicago Medical Society it was the opinion of that committee that abortions to full term pregnancy was as one to two. With a risk of 50 per cent of pregnancies being terminated by criminal methods it does seem insane to study these risks and give too much faith to them when we consider doing what is best for the mother in the presence of actual pathology. However I am sure for the usual case surgery in the pregnant as hysterectomy for fibroids or the removal of ovarian

cy is early in pregnancy is not doing the best for the woman or most certainly for the unborn child. In the former certain destruction awaits the child while in the latter interruption of pregnancy is common and too often seriously complicates the condition of the mother. Therefore in this matter of an ovarian cyst short of some sudden acute development like a strangulated torsion of the pedicle the best urgency is to await the time of full term then determine the procedure to be undertaken.

It is not so much the size of the tumor as its location that will determine difficulty in labor. A small ovarian tumor lodged in the cul-de-sac adherent may stir in unmountable difficulties to spontaneous labor or labor terminated by art through the natural channels whereas a very large tumor may be so located as to easily dislodge upward without any complications or disturbances labor may go on to a spontaneous conclusion. Therefore it is more the location than the actual size that decides the matter.

The risk of infection particularly in dermoid is of course great when left during the puerperium. It is difficult to say as to the recognition dermoid positively on the suspicion of a dermoid in pregnancy the sooner out the better. This subject came up in time in my report of double dermoids. I still firmly believe that dermoids from their structural content are more prone to infective processes than any other ovarian tumor and in that account whether of a low grade infection or a very severe infection prompts their early removal.

The ideal time to remove tumors ordinarily is near the time of full term if they in any degree suggest a reasonable probability of interference to labor. If the tumor is to be removed certainly the caesarean section should be done first and the tumor after. I believe caesarean section should always be done rather than to remove the tumor sewed up and then deliver spontaneously or by art.

The caesarean should be done first as immediately after the emptying of the uterus there is an enormous diminution of the blood supply through the broad ligaments and the pelvis in general. Therefore the hemorrhage if any may be the more easily controlled after the caesarean than before. Further we may secure thorough hemostasis if the tumor is first removed but with the emptying of the uterus the haptic traction may pull off the ligatures.

DR CHANNING W. BARRITT. The specimen is interesting and rather rare as compared with other cystic tumors but the question of diagnosis between a solid tumor and a cyst is not very im-

portant except perhaps that if it is a solid tumor it is apt to be malignant. The question however of whether a solid tumor of the ovary or a solid tumor of the uterus is present is an important one because it is the consensus of opinion that ovarian tumors should be removed nearly always when found while fibroids of the uterus, for very apparent reasons, should be left alone until they are decidedly giving trouble. Once when we start in to operate on a fibroid tumor of the uterus in pregnancy we are attacking the organ that contains the ovum and the condition is apt to end in a hysterectomy — although we may sometimes decide to do a myomectomy in such a case.

Just a word on the point of leaving the ovarian tumor alone if the woman has not had any children — that is, if she has not a living child and if to the woman the child *in utero* is important. If that child's chances are better if the ovarian tumor is left alone then there is no reason why one should be in a hurry to remove it. It is because we improve the chances for the mother and the child by removing the tumor that that operation is done and there is no question in my practice but that the mother and the child's chances are decidedly improved by early removal of the ovarian tumor.

Then there is a further question of leaving the alone when there is a double tumor. If the uterus has to contend with two tumors in view of it is more apt to become irritable and labor start than if it has to contend with one and statistically not how that the patient cannot go on to full term pregnant with both tumors removed. Of course it is true that experimental work has rather demonstrated that one ovary is part of an ovary — necessary to the uterus going on to term. But clinical work does not bear out that experimental evidence. A collection of cases shows that almost a great percentage have gone on to full term where two tumors have been removed — both ovaries — as where only one has been removed. It is certainly true that a portion of an ovary should be left if possible but I do not think that the fact that the patient has two tumors should keep us from removing them during pregnancy.

DR CARTER. Dr Barrett may ask if that is the true in cases in which both ovaries have been removed during the first three months of pregnancy?

DR BARRITT. I cannot say just the percentage but both ovaries have been removed in cases that were not far enough along so that they supposed they were pregnant and yet they went on to full term. According to experimental

evidence we would think that the earlier removed the less the chances of going on

DR CURTIS Have you ever seen instances of that kind? It has been experimentally and clinically demonstrated at least to my satisfaction that pregnancy cannot go on if the corpus luteum has been removed before the third month of pregnancy—that is before the third month has elapsed

DR BARRETT I don't think there is any answer except that there is clinical evidence that it has been done before the third month. It might be said and perhaps wisely that there was a supernumerary ovary or a bit of ovarian tissue left or a piece of ovarian shell on the broad ligament or that there was a little capsule of the ovary left on the uterus. Perhaps that could not be denied in these cases.

DR ARTHUR CURTIS The work which was done by Fraenkel demonstrated quite conclusively to his own satisfaction and also to the satisfaction of almost everyone reading his work that the corpus luteum is absolutely essential for the development of the fetus during the first half of pregnancy in rabbits. This same thing has since been repeated by a number of investigators and no one has been able to refute the arguments and findings which he advanced. I personally performed experiments of a similar nature and in every instance in which the corpus luteum was removed during the first third of pregnancy abortion or absorption resulted. When one performed an operation under exactly similar circumstances and removed portions of the ovary and did other operative procedures which were fully as traumatic as that of removing the corpus luteum the pregnancy almost invariably went on to term.

DR BARRETT Dr Berry of Mount Clemens a very reasonable man told me that he removed both ovaries and tubes and considered he did the operation very completely when pregnancy was so short a time along that he did not consider the woman pregnant and yet she went to full term.

DR DUNFORTH (closing) With reference to Dr Webster point as to the sequence of the two operations—cesarean section and removal of the tumor. I think long the cesarean first and removing the tumor afterwards is the logical order and in my own case I did it that way. However Hunt gives it the other way.

DR IRINA W. LYNCH and **RALPH W. WEBSTER** presented a paper on the Total and Ammonia Nitrogen in Toxemia of Pregnancy and Eclampsia Based Upon the Study of Twenty Cases of Eclampsia and Ten of Preeclamptic Toxemia.

The curve of the urinary nitrogen in a normal case of pregnancy was charted for six of the last weeks of pregnancy in a case which was followed by daily investigations (Paper to appear later).

DR R. W. WEBSTER In view of the fact that our chief conclusion has been that the determination of ammonia has little significance it would be well to explain our reasons for such conclusion as well as to state what probably leads to variation in the ammonia output normally. As Dr Lynch has said the subject of the ammonia output in the urine has received quite a shock from the study of the work of Folin. On a mixed diet the ordinary output of ammonia is from 4 to 5 per cent of the total nitrogen. Diminution of nitrogen in the food until you get up to a nitrogen free diet will give an ammonia output as high as 20 per cent of total nitrogen. If this is the case we can readily account for the ammonia increase in the toxemia and especially in the pernicious vomiting of pregnancy because in these cases the patients have very little food and are in a state of inanition. They are suffering therefore from a lack of nitrogen in the food and the ammonia output will increase. At the same time with this ammonia increase it is necessary that you get as a precursor of the increase in ammonia acetone and diacetic acid. You cannot have the ammonia increased without

Those are the points shown in one of the cases in which the acetone was not present at any time the ammonia output being at the highest 3.67 per cent. This is the condition that is the presence of acetone and diacetic acid with increased ammonia that is present in cases of diabetes and also in cyclic vomiting of children and the toxemia of pregnancy. However in eclampsia you have an entirely different proposition. I don't know whether Dr Lynch mentioned it or not but you can by determination of the urinary output especially the ammonia in the urinary output distinguish between the renal and hepatic eclampsia. You can distinguish it perhaps as well by the determination of the albumin and casts but you cannot always do it. If you assume that an increase in albumin is indicative of a renal eclampsia why then should you get the increased ammonia percentage in some cases and not in others?

One point regarding the possibility of varying the ammonia not only by diet but also by other means. As I said the percentage of ammonia is increased by lessening the nitrogen intake. At the same time the ammonia output is diminished

by the intake of alkalis. This is absolutely an essential fact in metabolism.

The work of Underhill a few years ago as you probably recall was taken up with the idea of showing that Williams' theory was correct which was that if the ammonia output is 10 per cent or more of total nitrogen you have a danger zone and must begin treatment at once. When Underhill finished he came to the opposite conclusion that the percentage of ammonia cut absolutely no figure.

The percentage variations are what we have been working at for many years. Our work is in a way an addition to that of Underhill only we go a little further and say that not only do the percentage variations of ammonia have no value in themselves but are of no use in arriving at anything conclusive regarding the toxic condition with which we are confronted in eclampsia. Whether or not we will have to change this idea remains to be seen but from the large number of cases we have studied up to the present time it does not seem that that will be necessary. The ammonia coefficient is not now and will not be of any value in the work.

Dr CHARLES B. REED. I approach the discussion of these papers with great humility because I have done no work on the subject myself and so far as I know the work that has been done is largely pioneer in character. I am deeply interested in the questions that the essays have brought forward and I would seek further enlightenment rather than spend time in futile argument. I would like to have them explain one or two points which seem a little obscure to me. First may I inquire what relation the nitrogen in the urine has to the presence or absence of a pernicious vomiting or of an eclampsia? Also can they throw any light on the question of renal and hepatic eclampsia? I don't just understand the difference between these two forms, as they describe them as to prognosis. This differentiation by origin is new to me and most interesting. Again what relation the ammonia or nitrogen or both may have to either form of eclampsia? I would like to know too if the discovery or the detection of either nitrogen or albumin or both in the urine of the pre-eclamptic or pernicious vomiting case would influence in any degree the character of their diets or the method of treatment. Apparently they have come to the conclusion that the detection of these substances is relatively useless as regards the condition or prognosis of the patient.

I would like very much to know if the gentlemen have concluded that the toxemia which de-

velops or expresses itself in an eclampsia is apparently the same toxemia which expresses itself as a pernicious vomiting of pregnancy?

Dr W. A. N. DORLAND. I will add one point only to what Dr Reed has said namely the study of the blood condition occurring *passim* with the condition of the urine that is as to the degree of its toxicity and the abnormal constituents it contains.

Dr LYCOT (closing the discussion on his part). When we first took up this work Stemon's very beautiful research on the nitrogen in the urine and faces had just been completed. His patients were kept on a high but not excessive nitrogen diet the amount of which was accurately measured. They were not kept in nitrogenous equilibrium under such circumstances the body gained nitrogen as had been suggested by one earlier observer Zacherewsky. Stemon's charted the ammonia only in terms of percentage yet calculation shows that it was also normal in absolute amount.

You will recall that texts on physiological chemistry at that time gave 13 grams of urea as the amount which should be excreted by the normal adult. We were still struggling with surprise that the urea in eclampsia was usually decreased to ten gram or less when our routine investigations showed that twenty grams was normal for the pregnant woman at term when upon a full mixed diet. Yet we cannot be blamed for believing that the nitrogen of the ten grams or so of urea apparently lost in the eclampsia cases was in reality present in the urine as a lower form of oxidation than urea and that suitable investigation would show percentages of the various nitrogenous substances which were characteristic of eclampsia. The normal case was studied with this point in view. Our work and the fundamental work of John show us that such belief is in error. We made no effort to keep our patient on a nitrogenous equilibrium or to measure accurately the food ingested since observations of this type were already recorded in the literature. We were attempting to find tests of clinical value which could be applied in pregnancies of which the previous diet was unknown.

While our work is unsuccessful from this point of view it has been of value from other sides. As a result of it we are unable to agree with Stone, Ewing, Wolf and others who believe that the pernicious nausea and vomiting and eclampsia are but the extremes of one general pathological process. It is quite worthy of notice that no case of eclampsia under our observation has given

the urinary findings of a marked acidosis. Indeed the ammonia excretion has exceeded normal in but three of the twenty cases.

In answer to Dr Dorland's question study of the blood has not been fruitful. At one time we worked in this field studying hemolysis and the complement at the time when everyone was using the then new Ehrlich methods. In a fairly large series there was but one case which had hemolytic power. She was otherwise normal. Our material was limited to pregnancy normal with albumin and eclampsias. Tests were made for hemolysis with the foetal and maternal blood for the three divisions just mentioned but without abnormal findings. The complement varied within normal limits. Several eclampsias were studied for the freezing point of the blood. This was found within normal limits. The alkalinity of the blood was studied in three cases. Two were normal but the one presenting variation was thought to show an increase of alkalinity which might be charged to the normal error of the experiment.

In answer to Dr Reed I will say that we divide our cases into hepatic or nephritic eclampsias according to the predominant lesion as shown in the urinary changes and the clinical history. For instance we believe the cases in which the albumin and casts rapidly disappear after convulsions are frankly of the hepatic type. These we expect to be acidoses. The urine in the nephritic type clears slowly. Often albumin persists six months or more. Suppression is more common in the nephritic type. The quantity of albumin is often very marked. One case showed 540 per cent of albumin by volume and it was necessary to dilute the specimen fifteen times before it could be read in the usual manner. The hepatic type very rarely is attended with suppression.

We have not meant to include the pernicious vomiting of pregnancy in this paper. We have spoken of it only as we have had to for the purpose of making a contrast. We hope to show and have to our own satisfaction shown that contrary to the simple eclampsias there is an entirely different picture in a marked acidosis in the vomiting case. We believe that in these cases the estimation of ammonia nitrogen is going to be followed by the very greatest help whereas in eclampsia it is useless.

The toxæmia we have more ammonia than is the ammonia above the normal average limit but we have other symptoms to guide us which are of more value. For instance we have come to the firm belief that it is useless to

temporize with women who present albumin and casts in the urine for any considerable period of time. We believe that the sooner delivered the safer you are as an obstetrician.

Dr Webster (closing the discussion) I want to add one point to the remarks made by Dr Lynch about the urea namely that we did not get the output looked for. It is quite common I believe for the profession at the present time to believe that 2 per cent of urea is the normal output. The output of urea must have reference to the output of total nitrogen. Hence when you say 2 per cent you must know if you are going to get any value whatever from the urea output how much total nitrogen is excreted. You cannot know entirely about the urea unless you know the total nitrogen. A patient may have one-half per cent urea and still be a normal individual. The question of the urea output in relation to toxæmia has reference entirely to the question of total nitrogen output and this again has reference to the diet to a very large extent.

The nitrogen free diet gives a low nitrogen output and under these conditions you find the patient with eclampsia and pernicious vomiting with a low nitrogen output. Our cases usually ran 5 to 7 per cent nitrogen and the only way we could increase this was by increasing the diet.

In regard to the relation of the diet to the ammonia output that is answered in the same way namely that the less nitrogen you give in your diet the higher the ammonia output and the nearer starvation you get your patient the higher the ammonia output. So that this question of ammonia output is one that is largely influenced by diet as well as by the condition prevailing.

Just one other point regarding the differentiation between renal and hepatic eclampsia. The hepatic type of toxæmia necessarily is associated with an acidosis as Dr Lynch has said. You cannot have any hepatic eclampsia or toxæmia without having an acidosis. This acidosis is necessarily associated with an acetoneuria and diaceturia. When ammonia is high there is acetone and diacetic acid. With renal eclampsia there is no acetone and diacetic acid. The ammonia may be low due entirely to the lack of nitrogen in the diet. If on a normal diet you get renal eclampsia you will find acetone and diacetic acid negative and urinary signs of renal trouble albumin casts and oedema. With the hepatic eclampsia you have closely associated toxæmia giving acetone diacetic acid and high ammonia output. You can differentiate them sharply for these reasons.

ular method was highly recommended a few weeks ago in current literature

I like Delorme's little book and I am glad to own it

THREE years have elapsed since the eighth edition of Rose and Carless appeared. In revising the old volume Dr Carless shows no strong reactionary or revolutionary tendencies. New illustrations a few new colored plates a full discussion of x-rays and radium and a new chapter on heat light and electricity have been added. Carless explains that he hopes these changes will help make the volume more useful and then he adds what to me are the most interesting lines of the book the short prayer that when the tenth edition is required the sounds of war and strife which boom on the ear as these lines are penned may long have ceased and that a righteous peace leading to a happy competition of race with race in the effort to promote not destruction but the welfare of mankind of all nationalities may have been established.

For years I have noted a strong preference on the part of students for Rose and Carless book. This is the highest commendation that could possibly be accorded the work. The fullness and balance the clearness the subtle power of appeal to students the excellence of classification and withal the keeping within bounds at responsible for the well merited success.

The book is much too well known to start in at this late day to detail its contents. We may hope however that when the smoke of battle has cleared and the tenth edition makes its appearance Carless will expound more fully the subjects of Ludwig's angina local anesthesia and the tuberculin and its therapy treatment for surgical tuberculosis. It might be well also to include a few words regarding the surgical approach to femoral hernia or at least to emphasize the difficulties sometimes encountered in the thigh approach.

Unless the unelected happens Rose and Carless and Da Costa will continue to preempt the field of general abdominal surgeries for students and in closing one may add that even the seasoned practitioner will teach or try often and with surprising advantage consult both these volumes.

THIS book on Operative Surgery by Taylor has been characterized by an English reviewer as a large and handsome lum. That it is and it is perhaps too costly a thing does not matter and a half. The English reviewer might well have added the subject which is for Taylor treats only those operations which are most frequently performed the head neck thoracic and abdominal regions further he has described only those operations which in his own experience he has

found to be most practical and satisfactory. The author tells us all this in his preface and in the very telling of it disarms the critic for the simple reason that no one may cavil at the choice of an operator whose experience fortifies his choice.

There are four sections devoted to Surgical Technique Head and Neck Thorax and Abdomen. Under section two the various operations on the skull mastoid jaws sinuses lips palate tongue pharynx larynx oesophagus lymph nodes and thyroid are described. Under section three are included only cancer of the breast empyema and pericardium. Under section four are included hernia an extensive discussion of stomach surgery the appendix intestinal resection malignant disease of the colon the rectum hemorrhoids bladder kidneys ureters prostate penis scrotum testicles and spermatic cord.

One cannot commend too highly the method adopted by Taylor in his descriptions of operative procedures. With typically English clearness he describes every step from incision to final suture and he has had all these steps illustrated by notably excellent cuts both in line and color drawings. One notes merely in passing that he uses a transverse incision in his subtemporal decompression. Many American operators have a well grounded preference for the vertical incision. No mention is made of Doy's operation for cancer of the lip. We feel sure that Taylor would find it satisfactory enough to incorporate it in the text if he could be persuaded to try the method. There is a natural sense of surprise at finding no mention of the very popular operation of Owen the Englishman for harelip. The one instance in which the author should have been most specific in his details regarding closure namely cancer of the breast he has slurred over in a few lines. But there is no profit in such analysis, for after all Taylor tells us that he furnishes us with methods which he himself has found good and trustworthy. It is an unqualifyingly good book to have if for no other reason than to be able always to consult Taylor's preference.

THE REVISION is not enough change in this new third edition of Moynihan's book on Abdominal Operations to warrant any specific additions to the former reviews that we have published. The author has added just enough new material to necessitate dividing the work into two halves, volumes and this in itself is a decided advantage for the old volume edition was almost too bulky for comfortable handling.

Since the appearance of the last edition there has been rather active agitation for and against the routine performance of gastro-enterostomy in the treatment of perforated gastric and duodenal ulcer. It is interesting therefore to note Moynihan's views on this subject. He recognizes the advantages of gastro-enterostomy in permitting a more a sured

THE BOOK is published by H. K. Lewis, Ltd., 10, Bedford Square, London, W.1. The price is 10s. 6d. (h.f.s.). The book is published in two volumes, the first volume containing the text and the second volume containing the illustrations. The book is published in two volumes, the first volume containing the text and the second volume containing the illustrations. The book is published in two volumes, the first volume containing the text and the second volume containing the illustrations.

ABDOMINAL OPERATIONS BY S. HENRIK MOYNIHAN, M.D. (LOND.) F.R.C.S. Third Edition. Illustrated by J. H. B. and London W. B. Saunders Company.

closing of the ulcer and the early administration of food and at the same time guarding against recurrence of the ulcer or the development of a second ulcer. Nevertheless he illustrates his experience has shown that the routine performance of gastro-enterostomy in cases of perforated ulcer is unnecessary. Gastro-enterostomy is only to be done in those cases where an obstruction is present or is likely to develop from the closure of the ulcer or where a second ulcer is seen. This is terse and fairly dogmatic counsel which carries the weight of high authority.

The second volume opens with a new and excellent chapter on the surgery of the large intestine. The anatomy of the colon is first discussed very fully and then the various regions of the colon are described in detail and very clearly. The positive axiom is laid down that of one thing there can be no question in cases of a ute obstruction (due to neoplasm) no attempt to revert the growth and to perform an immediate restitution of the canal is

justifiable. The immediate indication is to afford relief and the surgeon should never be persuaded into doing more than that.

One cannot help wondering why Meyman does not include resection of the rectum. In the preface we are told that the kidneys and bladder were omitted from consideration because they are only partially intraperitoneal; possibly this same reason governed the author in his decision not to include the rectum as coming within his scope. This is a pity because so few books contain an adequate description of the operations for carcinoma of the rectum. Such a description as Miles contributed to the *British Journal of Surgery* in October ought to be incorporated in every good book on intestinal surgery.

One could hardly be satisfied with a second edition knowing that this third edition is out so again the sense of possession asserts itself even though the newer work is not manifestly altered in principle or scope.

BOOK REVIEWS

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selection will be made for review on the interests of our readers and space permits.

TEXTBOOK OF CLINICAL OPERATIONS Illustrated by clinical observations of the physicians and surgeons. By Professor Felix Krause in association with Emil Heymann M.D. Translated into English and edited by Albert Ehrenfeld M.D. F.R.C.S. 4 volumes. New York: Kohns Company 1914.

MATHEMATICS By A. S. Woodcock, M.D. B.S. (London) M.R.C.I. (London). New York: Longmans, Green & Co. London: Edward Arnold & Co.

THE CLINICAL PRACTICE OF SURGERY BY DR. J. B. MURPHY, M.D. & MRS. J. B. MURPHY, L.D.S. Vol. III. No. 6 December 1914. Philadelphia and London: W. B. Saunders Company 1914.

A TREATISE ON THE SURGERY OF THE PELVIS BY THE MEDICAL SERVICE OF THE UNITED STATES FOR THE FISCAL YEAR 1914. Washington: Government Printing Office 1914.

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THE FUTILITY OF ARTERIOVENOUS ANASTOMOSIS IN THE TREATMENT OF IMPENDING GANGRENE OF THE LOWER EXTREMITY

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IN the course of some investigations in the treatment of diabetic gangrene of the lower extremity I became interested in that operative procedure variously known as arteriovenous anastomosis the Wiething operation or reversal of the circulation. This consists in a laterolateral (generally with proximal ligation of vein) terminolateral (artery to vein or vein to artery) or terminoterminal anastomosis usually between the femoral artery and femoral vein. This operation was first attempted in the human by the Spanish surgeon San Martín y Satrustegui in 1902 although unsuccessful experimental attempts had been made as early as 1881 by François-Franck and in 1896 by Petit. It was popularized by Wiething of Constantinople in 1908 and it has since found numerous supporters notably Bernheim of Baltimore and very recently Goodman of New York. From the experimental standpoint Carrel has been its most prominent sponsor.

The fundamental principle on which this operation is based is very obvious. In cases of gangrene or rather of threatened gangrene of the lower extremity due to imperfect arterial circulation an anastomosis between the femoral artery and femoral vein should permit a flow of blood through the latter and thus preserve the nutrition of the limb. The advocates of the operation all claim that this

is possible and insist that the venous valves offer no permanent barrier to the pressure of the arterial system.

In the hope of applying this operative procedure to suitable cases I devoted some time to a study of the subject and after a careful perusal of the literature became very doubtful as to the physiological and anatomical soundness of the operation. In spite of considerable evidence that has accumulated that this so called reversal of the circulation is not only an unsatisfactory but also a somewhat dangerous operation it is, nevertheless still extensively utilized and there are indications that it is even becoming more popular. As far back as 1903 Gallois and Pinatelle showed that after the injection of colored liquids into the femoral vein the liquids returned at once through the adjacent tributaries and that when these were clamped there was no flow into the vein. They believed however that in advanced age and in certain diseased conditions of the veins the obstruction on the part of the valves was less certain.

In 1911 Coenen and Wieworowski published an admirable critical study of the entire subject and came to the conclusion that the operation was not only thoroughly unsound but actually dangerous. These investigators in a number of preliminary experiments found that it was not possible

to obtain a permanent result with an arterio-venous anastomosis and that a thrombosis or an obliteration invariably followed the operation after a certain length of time. These results coincided with those of San Martín y Satrustegui, Vignolo, Exner, Hopfner and Stich, Makkas and Dowmann, Coenen and Wieworowski were unable to verify the successful experimental results of Carrel, Morel, Guthrie, Watts, Tuffier, Frouin and Hadda. In attempting to reverse the circulation in the leg of a dog they found by direct observation that the valves of the veins could be only partially forced and that anything like a complete reversal was out of the question. They also attempted a reversal in the kidney circulation where there are no venous valves here they were likewise unsuccessful. They further performed arteriovenous anastomoses in dogs at points where ligation of the large vessels resulted either in death of the animal or necrosis of the extremities. In each instance the anastomosis had the same effect as a ligation in other words the operation was only successful when collateral arterial circulation was still possible. They next attempted retrograde injection of the kidney vein with colored fluid and could not force this fluid into the arterial system. They connected a Huerthle stromuhr with artery and vein and were unable to obtain a flow. They then performed numerous cadaver experiments in human and animal cadavers as to the possibility of retrograde injection of the larger veins. The results of this series showed that the venous valves prevented a flow toward the periphery even when great pressure was used. They finally analyzed the hitherto published results of the operation in the human and found in 35 cases 30 absolute failures cases which either resulted fatally or which required eventual amputation.

In a later paper Coenen added more experimental data supporting his views and Hauke substantiated these claims by some further experimental work. Rothmann in a series of very beautiful experiments then studied the question by directly observing the capillary circulation in the mesentery and web of the foot of a frog. He concluded

that if there were valves in the veins there was absolutely no possibility of reversal. If there was one vein without a valve a certain amount of reversal was possible. From 2 to 5 per cent of the injected liquid went through the capillaries but this retrograde injection was accompanied by excessive edema. If there was more than one vein without a valve a very small percentage might go through the capillaries but the main return flow was through the venous anastomosis. The conclusions of Coenen have also been verified by Fedorowitsch.

On account of the diversity of the experimental and clinical results of various investigators and especially because of the optimism expressed by many notwithstanding the above mentioned unfavorable conclusions I determined to satisfy myself by some personal study as to the utility of arteriovenous anastomosis in cases of impending gangrene of the lower extremity due to arterial obstruction. I wished to devise a method of imitating in the experiment the conditions present when such an operation might be indicated. My aim was to find some way of graphically recording the amount of arterial circulation possible through venous channels and I called upon the X ray as an aid. I felt that by using lower extremities freshly amputated in cases of gangrene due to arteriosclerosis or other arterial disease and variously injecting these with liquids impenetrable to the roentgen ray I would obtain radiographic pictures that might throw some light on the subject. It was of course essential that the injection be performed with a pressure equal to or exceeding a high blood pressure. There was some difficulty in finding the proper liquid for the purpose but after a few attempts with collargol and neutral lead acetate solutions I finally adopted an emulsion of red oxide of lead in paraffin oil equal parts. A somewhat similar emulsion has been recommended by Hauch who used it in studying radiographically the arterial system of the kidneys. I had originally intended to utilize a continuous gravity method for the injection so that the pressure would correspond to about 250 mm of mercury but

as this was only applicable with solutions I later adopted a hand syringe

In general the technique was as follows The vascular system of the freshly amputated limb was thoroughly irrigated with saline solution through the artery There was not the slightest difficulty in obtaining a prompt return of fluid through the vein Incidentally it was never possible to force the fluid to run through the vein in a backward direction When the blood was entirely washed out the vein was injected When the hand syringe was used the injection was made intermittently in imitation of the heart beat It was continued for some time usually about thirty minutes and was made with considerable force Leaking tributaries were clamped and ligated The vein which in variably became enormously distended in its visible portion was then tied off and the limb radiographed In some of the experiments I then removed the ligature from the vein and injected the artery with the same material and in the same way in order to obtain an arterial injection for comparison with the venous injection in the same extremity and incidentally to study the arterial circulation in these cases of gangrene due to arteriosclerosis or other arterial obstruction The particular advantage of the red oxide of lead emulsion in these arterial injections was that the lead was arrested at the capillaries and did not diffuse into the tissues while the paraffin oil separated from the emulsion in the capillary network and washed out the previously injected vein Leaking branches were clamped and ligated the artery was tied off and the extremity was radiographed again The gangrenous limbs that were used were all from cases with more or less marked arteriosclerosis or at least, arterial occlusion and apparently normal veins

Although the material at my disposal has not been extensive I believe it is sufficient to draw certain conclusions and I feel that the results are interesting enough to warrant publication Therefore without further comment I beg to submit the following experimental data

Experiment N 1 G Z 1 40-1914 male age 39 Amputation at junction of upper and middle

third of left leg for diabetic gangrene of plantar region first and third toes second toe missing No dorsalis pedis, posterior tibial or popliteal pulse felt Marked calcareous degeneration of the arteries Veins normal Injection of a 10 per cent collargol solution into the anterior and posterior tibial veins by gravity method at 3 m for 18 hours The main leaking tributaries were clamped and ligated About 350 ccm of fluid were used a good portion of which apparently ran out through smaller collaterals which were not clamped The veins were tied off

Radiographic examination of the injected limb (Fig 1) shows a certain amount of circulation of the injecting fluid particularly in the middle third of the leg The anterior and posterior tibial veins especially the latter are well injected for 3 to 4 cm and a number of the smaller collaterals show the presence of the injecting fluid The internal plantar vein and the venous plantar arch and digital tributaries show traces of the injecting fluid but there is no real capillary circulation although some of the smaller venules are injected The region of the ankle shows relatively little injection In some places the injecting fluid stops abruptly in the veins forming slight bulbous enlargements

Experiment No 2 W P 1139-1914 male age 74 Amputation at junction of middle and lower third of right thigh for diabetic gangrene of outer side of foot involving fourth toe fifth toe missing No dorsalis pedis or posterior tibial pulse felt Popliteal pulse felt Moderate calcareous degeneration of artery Vein normal Injection of a 20 per cent neutral lead acetate solution into the popliteal vein by gravity method at 28 m for 44 hours The main leaking tributaries were clamped and ligated About 420 ccm of fluid were used some of which ran out of smaller collaterals which were not clamped and some of which diffused through the amputation wound The popliteal vein was tied off

Radiographic examination of the injected limb (Fig 2) shows a diffusion of the injecting fluid in the popliteal region extending down the leg to the junction of the middle and lower third but mainly in the upper third There is no evidence of the injecting fluid in the neighborhood of the ankle or in the foot There is no sign of any capillary circulation There is a visible calcified anterior tibial artery at the ankle

In all of the subsequent experiments the injection was made with a hand syringe and a 50 per cent emulsion of red oxide of lead in paraffin oil was used The injection was made intermittently Leaking tributaries or branches were clamped and ligated and the vein or artery tied off

Experiment 3 M L 1048 1914 male age 44 Amputation at junction of upper and middle third of left thigh for recurrent sarcoma of

lower third of femur with spontaneous fracture. Vessels normal. Previous to the amputation there was a continuous venous hemorrhage due probably to an erosion or puncture by a bone spicule of a main venous trunk. Forcible injection of the femoral vein.

Radiographic examination of the injected limb (Fig. 3) shows the presence of the injecting fluid extending into the popliteal vein to a point just below the knee joint corresponding to the region where the anterior and posterior tibial veins unite. The fluid terminates abruptly in several bulbous enlargements. There is some injection of the smaller tributaries of the femoral vein. A large mass of the injection material apparently fills the old wound cavity. This is doubtless the result of a leakage through the opening in the vein that bled *in a tiam*. There is no evidence of any capillary circulation or of any injecting fluid below the tuberosity of the tibia.

Experiment No. 4 C S 2852-194 male age 53. Amputation at junction of middle and lower third of right thigh for diabetic gangrene of outer side of foot fifth toe and fifth metatarsal missing. No dorsalis pedis or posterior tibial pulse felt. Popliteal pulse felt. Rather marked arteriosclerosis. Vein normal. Forcible injection of the popliteal vein.

Radiographic examination of the injected limb (Fig. 4) shows a marked dilatation of the popliteal vein down to a short distance below the knee joint at a point corresponding to the junctions of the anterior and posterior tibial veins. The beginning of the posterior tibial vein is also distended and there is a trace of the injection material running a short distance down into this vein. The anterior tibial vein contains injection material in the upper third of the leg to a point 12 cm. below the knee joint but then the injection stops more or less abruptly. Some tributaries show distinct blocking by valves just near the junction with the main vein. There are a few scattered particles of the injection material in the middle third of the leg and a tributary of the lower part of the popliteal shows an injection for a short distance from the main trunk. There is absolutely no evidence of any capillary circulation and the lower part of the leg and the foot are entirely devoid of any injection. Calcified anterior and posterior tibial arteries are visible especially at the knee.

Experiment No. 5 Same extremity as Experiment No. 4. After removal of the ligature from the injected popliteal vein the popliteal artery was injected. It was particularly noticeable that the liquid flowed into the artery much more easily than into the vein. The red oxid. of lead emulsion which had been injected into the vein gradually flowed out under the pressure of the arterial injection and eventually came out clear paraffin oil.

Radiographic examination of the injected limb (Fig. 5) shows an injection of the entire arterial system of the extremity. Considering the marked

arteriosclerosis, it is astonishing to observe how relatively perfect this injection is. The main trunks especially the peroneal show slight interruptions. The dorsalis pedis artery is not in evidence below the midtarsal region. In its lower portion the posterior tibial artery is somewhat thinned. In the dorsal region of the foot in the toes and in the posterior part of the heel, the circulation is defective but in the rest of the extremity the capillary network is unusually well demonstrated even in the peripheral portions. The veins are entirely empty. In the foot are seen blotches of injection material due to leakage through the old wound.

Experiment No. 6 O B 3951-1914 female, age 61. Amputation at junction of middle and lower third of right thigh for diabetic gangrene of plantar region second toe gangrenous third toe missing. No dorsalis pedis or posterior tibial pulse felt. Popliteal pulse felt. Rather marked calcareous degeneration of artery. Double vein walls normal. Very forcible injection of larger vein (posterior tibial). Excessive pressure was used.

Radiographic examination of the injected limb (Fig. 6) shows a mass of injection material filling the popliteal space and extending nearly to the middle of the leg. The vein has been ruptured by the excessive pressure used in the injection and the injecting fluid has escaped into the tissues. There is a slight injection of a few tributaries anteriorly and posteriorly but there is no evidence of capillary injection and no injection material is visible below the middle of the leg. Several calcareous arteries are seen especially the posterior tibial at the knee.

Experiment No. 7 Same extremity as Experiment No. 6. After removal of the ligature from the injected posterior tibial vein the popliteal artery was injected. The injection was made with considerably less force than was used to inject the vein.

Radiographic examination of the injected limb (Fig. 7) shows a fair arterial injection of the extremity. The old mass from the venous injection and rupture is naturally still present. The popliteal and anterior tibial artery down to the lower third of the leg are fairly normal. At this point there are a number of interruptions and just above the ankle joint the anterior tibial artery stops abruptly. The posterior tibial artery is imperfectly injected but at the ankle it is seen considerably reduced in lumen. The peroneal and dorsalis pedis arteries are not injected. Some of the digital arteries are injected but altogether the injection of the foot is poor. The capillary injection of the limb is moderately good especially in the middle and lower thirds of the leg.

Experiment No. 8 M H 539-194 male age 55. Amputation at junction of middle and lower third of right thigh for diabetic gangrene of foot especially first and second toes and plantar region third fourth and fifth toes missing. No dorsalis pedis or posterior tibial or popliteal pulse felt.

Very extreme calcareous degeneration of arteries. Veins normal. A microscopic examination of the popliteal vein and artery shows the vein to be absolutely normal while the lumen of the artery is reduced about 50 per cent by a fibrous and calcareous deposit in the intima. Forceful injection of the popliteal vein.

Radiographic examination of the injected limb (Fig. 8) shows a distention of the popliteal vein and of the beginning of the anterior and posterior tibial veins. The injection ends abruptly just below the knee joint. One injected tributary of the popliteal is lying in front of the vessel. There are slight traces of the injecting fluid in the upper third of the leg. There is no capillary injection and there is no injection material seen below the junction of the upper and middle third of the leg. A calcareous anterior tibial artery is visible.

Experiment No. 9 Same extremity as Experiment No. 8. After removal of the ligature from the injected popliteal vein the popliteal artery was injected. The injection was made with much less force than was used to inject the vein. The injection was continued until fairly clear paraffin oil flowed from the popliteal vein.

Radiographic examination of the injected limb (Fig. 9) shows an extensive injection of the entire extremity. The anterior tibial and dorsalis pedis arteries can be traced down to the metatarsal region; they are fairly normal in size and the injection is practically uninterrupted. What seems to be the posterior tibial artery is seen injected for about 3 cm, but the main branch is apparently obstructed or at least is not visible in the middle of the lower part of the leg or in the ankle. There are however numerous unusually large collateral branches seen in the calf. The peroneal artery is not injected. The capillary injection is remarkably good and extends down into the toes. There are traces of the injecting fluid still seen in the popliteal

Experiment 10 W. R. 6126-1914 male age 63. Amputation at junction of middle and third of left thigh for senile gangrene (thromboangiitis obliterans possibly Raynaud's disease) of foot involving all the toes to the metatarsal region. No dorsalis pedis posterior tibial or popliteal pulse felt. The popliteal vein is normal but the popliteal artery is an exceedingly small cordlike trunk firmly imbedded in fibrous tissue. The lumen is partially obliterated by what appears to be a organized thrombus. A microscopic examination of the popliteal artery shows an organized but partially calcareous thrombus attached at one point to the intima and reducing the lumen of the artery to at least 50 per cent. Forble injection of the popliteal vein.

Radiographic examination of the injected limb (Fig. 10) shows a distended popliteal vein the junction of which ends abruptly about 3 cm down just below the knee joint in a bulbous enlargement. Several large and smaller tributaries

in the popliteal space are injected but the larger of these all show abrupt terminations with bulbous dilatations. There is a trace of the injecting fluid a little below the injected vein but no injection material is seen below the tuberosity of the tibia. There is no evidence of any capillary circulation.

Experiment No. 11 Same extremity as Experiment No. 10. After removal of the ligature from the injected popliteal vein the popliteal artery was injected. A little difficulty was experienced in inserting the cannula into the artery on account of the obstruction of the lumen by the organized thrombus but when once the cannula was in proper position the injecting fluid flowed freely and much less force was used than with the injection of the vein. The injection was continued until clear paraffin oil returned through the popliteal vein.

Radiographic examination of the injected limb (Fig. 11) shows a remarkably good circulation even to the smallest capillary anastomosis down to the gangrenous metatarsal region. The anterior and posterior tibial and peroneal arteries are well injected although somewhat narrow. The dorsalis pedis is not injected. In the upper and middle third of the leg the circulation is exceptionally good. In fact the injection of the capillary system is so dense that the outlines of the main vessels and of the bones are somewhat obscured. The nutrient vessels of the femur can also be distinguished. Some of the injecting fluid is seen spread over the gangrenous area evidently leaking through the wound in the foot. Some traces of the venous injection are still seen.

Experiment No. 12 J. M. 6012-1914 male age 63. Amputation at junction of upper and middle third of right leg for senile gangrene of second and third toes. No dorsalis pedis or posterior tibial pulse felt. Popliteal pulse felt. Very extreme calcareous degeneration of arteries. Veins normal. Forceful injection of larger posterior tibial vein. Prompt leakage through a large tributary was especially noticeable.

Radiographic examination of the injected limb (Fig. 12) shows the posterior tibial vein distended with the injecting fluid for 2 cm. The injection ends abruptly. A large tributary behind the vein is also filled up to the amputation wound. A few smaller tributaries in the immediate vicinity show traces of the injection material but there is no further injection in the leg or foot. There is no evidence of any capillary circulation. In the middle third of the leg a calcareous posterior tibial artery is visible and in the anterior part of the ankle a calcareous anterior tibial artery is seen.

Although the anterior and posterior tibial and peroneal arteries were patent the lumen was so narrowed and the atheromatous degeneration so extreme that efforts to insert the cannula for injection had to be abandoned.

Experiment No. 13 Same patient as Experiment No. 12. Re amputation at middle of right thigh for gangrene of flaps after amputation at

junction of upper and middle third of leg for senile gangrene Very advanced calcareous degeneration of artery Vein normal Forcible injection of femoral vein It was particularly noticeable how promptly the injected fluid returned through two larger tributaries

Radiographic examination of the injected specimen (Fig. 13) shows the femoral and popliteal vein well injected for a distance of 12 cm. or to a point corresponding to the level of the knee joint. There is a distinct bulbous enlargement at the termination of the injection of the vein into this dilated end run two tributaries apparently the anterior and posterior tibial veins the former injected for about 3 cm. and the latter 2 cm. Two large collaterals, one running in front of the main trunk and one behind it are injected up to the amputation wound. Several large anastomotic branches join these two tributaries the posterior tributary is likewise connected to the posterior tibial vein by a fine anastomotic vessel. Behind this posterior tributary there is a fine venous anastomosis and there is another anastomosis anterior to it just below the amputation wound. Anterior to the femur just below the amputation wound a few small tributaries are injected. Along the larger veins are occasional bulbous protuberances evidently the endings of other tributaries obstructed by valves. There is no evidence of any capillary circulation. Below the knee joint the calcareous popliteal artery is visible down to and including its bifurcation into the anterior and posterior tibial arteries. Posterior to this a smaller calcareous artery can also be seen.

Experiment No. 14 Same extremity as Experiment No. 13. After removal of the ligature from the injected femoral vein, the femoral artery was injected. The injection was made with much less force than was used to inject the vein. Considerable material promptly ran through the wound at the end of the stump.

Radiographic examination of the injected specimen (Fig. 14) shows an excellent arterial injection. The femoral and popliteal artery continued down into the anterior tibial is well injected up to 2 cm. above the end of the stump. The lumen is distinctly narrowed. The posterior tibial artery is not injected at the bifurcation although near the wound at the stump it contains small amount of injecting material. Several large collateral branches are seen at the beginning of the artery and also at the knee-joint. The capillary system is very well injected. A large portion of the venous injection is still visible.

Experiment No. 15 M. K. 6097, 914, 1 male age 50. Inter capulothoracic amputation of left upper extremity for recurrent sarcoma of humerus and shoulder. Vessels normal. By mistake a large vein was taken for the axillary and injected. This vein was later found to be the cephalic and to correct the error as much as possible of the injection material was expressed. The axillary vein was the forcibly injected.

Radiographic examination of the injected limb (Fig. 15) shows traces of the injecting fluid in the cephalic vein down to the junction of the upper and middle third of the arm. The axillary vein is well injected down to almost the middle of the arm where it stops abruptly. A large tributary evidently the subscapular is well injected to a point corresponding to the midscapular region where it terminates in an anastomotic network. Numerous smaller tributaries in the immediate vicinity of the main trunks are injected and apparently anastomose with one another. There is a trace of injection material in the lower third of the arm but none is seen in the forearm hand or fingers. At several points along the larger veins are bulbous protuberances clearly the entrances of tributaries obstructed by valves. There is no sign of any capillary injection.

Experiment No. 16 Same extremity as Experiment No. 15. After removal of the ligature from the injected axillary vein the axillary artery was injected. Much less force was used than with the venous injection and injection was continued until fairly clear paraffin oil flowed from axillary vein.

Radiographic examination of the injected limb (Fig. 16) shows a splendid arterial and capillary injection of the entire extremity to the finger tips. In the middle of the arm anterior to the humerus is seen a mass of injection material which has escaped into the tissues due to rupture of a small vessel. The sarcomatous condition of the tissues probably accounts for the friability of the vessel. Traces of the venous injection are still visible.

Experiment No. 17 N. K. 7015-1914, male age 35. Amputation at junction of middle and lower third of right thigh for gangrene of outer side of dorsum of foot and of heel due to thrombo-angiitis obliterans. Fourth and fifth toes missing. No dorsalis pedis posterior tibial or popliteal pulse felt. Artery is a small cordlike strand embedded in fibrous tissue and almost entirely occluded by a firm organized thrombus. In normal. Forcible injection of popliteal vein.

Radiographic examination of the injected limb (Fig. 17) shows the injection material filling the popliteal vein and extending down rather higher than usual into what appears to be the posterior tibial vein. This latter vein is well filled in the upper third of the leg and traces of the injection are seen in the vein as far down as the middle of the leg. A few tributaries of the popliteal are injected. Some lie in front of the vein and some are seen behind it just below the amputation wound. There are a few fibrous projections along the injected vein. It is particularly prominent anteriorly about 7 cm. below the knee joint. These projections are undoubtedly tributary openings blocked by valves. There is absolutely no trace of a capillary injection and no injection material is seen below the middle of the leg.

Experiment No. 18 Same extremity as Experiment No. 17. After removal of the ligature from

the injected popliteal vein the popliteal artery was injected. In spite of the fact that the artery was very small and almost entirely occluded by an organized thrombus after the cannula was in proper position the injecting fluid flowed freely and much less force was used than when the vein was injected. The injection was continued until fairly clear paraffin oil returned from the popliteal vein.

Radiographic examination of the injected limb (Fig 18) shows a fair arterial injection of the extremity. The main trunk of the popliteal artery shows several interruptions. The anterior tibial is seen in the lower half of the leg very much narrowed. It is continued into the dorsalis pedis, also much narrowed up to the tarsometatarsal junction where it stops rather abruptly. The posterior tibial artery is only visible at the internal malleolus. It is of very small caliber. There are several large collateral branches especially one above and one below the knee joint anteriorly and one posteriorly running almost the entire length of the leg and situated quite superficially. The peroneal artery is not injected. The capillary injection around the knee and in the upper half of the leg is good. It is not good in the lower half of the leg and it is very poor in the tarsal and metatarsal regions and in the heel. The toes however show a very passable capillary injection. Remnants of the venous injection are still visible.

Although of course it must be conceded that the results of these experiments are not absolutely conclusive I feel that they are very significant. What conclusions can one draw from a study of the experimental data? The most obvious fact is that with one exception (Experiment No 1 and Fig 1) there is no flow to any extent through the vein toward the periphery and that there is no evidence of any capillary circulation after venous injection. The valves judging by the bulbous terminations of the injected vessels are apparently the cause of the obstruction. It is certainly evident that this obstruction cannot be entirely overcome even by extreme force for it is clear from the radiographs that the veins are distended almost to the bursting point and that even in one instance where excessive force was used and the vein ruptured (Experiment No 6 and Fig 6) there is no sign of any peripheral circulation through the venous channel. I confess that I am somewhat at a loss to explain the exceptional result in Experiment No 1. I cannot account for it by the fact that the injection was made through the smaller veins since in Experi-

ment No 12 an injection was also made of a smaller vein and the result was quite similar to those when the larger veins were injected. It is possible that the valves in these veins were less resistant. Even in this case however although it is true that the injecting fluid does reach the foot it does not circulate to the capillary tributaries. One fact stands out preeminent and that is that when the larger vein of the thigh is injected the fluid can be forced only for a short distance into the main trunk and into a few immediate tributaries in which and in their anastomoses the flow is central. One or two sets of valves may be overcome but eventually usually just below the level of the knee-joint the obstruction is insurmountable.

Since the completion of the above series of experiments I have learned that Wieworowski, the former collaborator of Coenen has independently come to practically the identical conclusions in regard to the retrograde venous circulation. They are based on radiographic studies of iodipin injections into the veins of living and dead animals. In the one experiment on the upper extremity which I had the opportunity of performing (Experiment No 15 and Fig 15) entirely similar conditions prevailed.

In the second type of experiment namely the injection of the arterial system of the same extremity in which the vein had been injected previously a startling fact is brought out. In even much more advanced cases than those in which arteriovenous anastomosis might possibly be indicated no matter how extensive the gangrene or how diseased the artery may be there is a relatively perfect arterial circulation down to the minutest capillary in those portions of the limb that are not already gangrenous. If a main artery is obstructed an ample collateral circulation seems to form (Fig 9). Not only are these facts clear but it is likewise true that much less force is needed to produce an excellent arterial and capillary injection than was used to produce the imperfect venous injection.

I appreciate that the familiar argument will be advanced against these experiments that the injection is not analogous to the conditions

TABLE OF CASES OF ARTERIOVENOUS ANASTOMOSIS

DEATHS AFTER OPERATION

1 Tyfer 907 M 45	10 Payr 900 M 70	18 Got stem (Coenen and	4 Zavas 9
1 Lohndahl 907 M 20	11 Miller 900 M 63	19 Newsworld 9	5 D'Ors 90 3
2 Hubbard 900 M 77	12 Kawada 9 M 6	20 Gattison (Coenen and	26 D'Ors, 912
3 Celena 900 F 5	13 M uclure or M 7	21 Newsworld 20	7 D'Ors 9
4 Imbert (also Follie) 900 M	14 Mauchure 900 F 7	22 Got stem (Coenen and	28 Kerr 912 F 6
5 Funderlin 900 M 4	15 Via way 900 F 5	23 Wernicowski 9	29 V ugha (Yeuman) 9 4
6 Schmeden 900 F 48	16 C Beck (Halstead and	24 Mantell 901 M 5	30 G F Miller 904
7 Tietze 900 F 60	17 ugha 9	25 Luxembourg 901 M 51	(Personal communication)
8 Goldstein (Tietze) 9	18 Halstead 9 F 6	26 Waring 9 M 60	
		(Upper extremity)	

DEATHS FOLLOWING AMPUTATION

1 Sadrategus 900 M 25	3 J bouley (Charnou) 908	1 G P Müller 900 M 51	9 Maroon 9 M 79
2 Jabonlay (also Leercle) 900	4 J bouley (Monod and Van	20 Mauchure 900 F 73	10 Goodman 90 M 5
3 Finsell 900 M 7	21 wirtz 90 M 67	21 Mauchure 900 F 68	11 D'Ors 9 M 65
		22 Halstead M 6	(Personal communication)

AMPUTATIONS

1 Hubbard 906 M 20	13 Bier (also P Müller) 9	1 Greffenhagen 90 M 33	24 Goodman 901 M 45
2 Hubbard 907 F 60	14 M 38	25 (Upper extremity)	25 Goodman 90 3 M
3 Tietze 907 M 40	15 Sh mal 9	26 Waring M 40	26 Goodman 912 M
4 Hubbard 908 F 24	16 Kadel (also Kriger 900)	27 Hesse M 40	27 Goodman 90 3 F 87
5 Lund 908 M 3	17 20 F 43	28 Bernheim M 40	28 Goodman 912 M 2
6 Ohrs (Waring) 908	18 Krause (Quail) 9 M 43	29 Waring 9 M 3	29 Goodman 90 3 M 38
7 Abalos 900 M 6	19 C Beck (also Halstead and	30 Bogoras 90 M 3	30 Hasset 90 3 M 6
8 Imbert (also Lacroix) 900	20 V ugha 90 M	31 Monod 90 M 3	31 Pulman 90 3 M 30
9 M 5	21 Coenen M 5	32 Monod 90 M 7	32 Beyer 9 M
10 Arnes and Smith 900	22 Waring 90 M 23	33 Ohrs (Waring) 90	(Personal communication)
11 M 60	23 Ohrs (Waring) 90	34 Goodman 912 M 1	33 Beyer 90 3 M
12 Waring 900 M 35	24 M 40	35 Goodman 9 M 4	(Personal communication)
13 Funderlin 900 M 35			34 Bernheim 90 3 M 6
14 J bouley (Monod and Van			35 Bernheim 90 3 M 6
15 wirtz 900 M 66			

OPERATIONS ABANDONED ON ACCOUNT OF CONDITION OF VESSELS

1 Schmeden 900 M	6 Greffenhagen M 33	9 Goodman 90 M 3	1 G P Müller 90 M
2 Schmeden 900 M 6	7 (Upper limb y)	10 Goodman 90 3	(Personal communication)
3 Ohrs (Waring) 9	8 Hesse 90	11 Goodman	
4 Liger 90		(Personal communication)	
5 Unger			

NEGATIVE OR DOUBTFUL CASES

1 Sadrategus 900 M 70	1 Bernheim 9 M 27	1 Tietze 90 M	1 Gattison 90 3 M 38
2 Tyfer (Lottard) 907	2 Bernheim F 6	2 (Upper extremity)	(Personal communication)
3 M 30	3 Bernheim M 5		
4 Coenen 90 F 55	4 (Upper limb y)		

SUCCESSSES IN UPPER EXTREMITY

1 Doherty 907 F	1 Waring 9 M	1 Bernheim 90 F 7	1 M
2 Hesse 90 M 7	2 Bernheim		

SUCCESSSES IN LOWER EXTREMITY

1 Waring 908 M 40	1 Bernheim 9 F 7	1 Goodman 90 M	1 Tietze (also D'Ors) 912
2 Hesse 908 M 35	2 Bernheim F 7	2 Goodman 912 M 35	2 D'Ors 33
3 J B Murphy 900	3 Deven 9 M 6	3 Tietze 90 M 35	3 Vaughan 90 3 M 65
(also Bernheim)	4 Goodman 9 M	4 Waring 90 12 M 33	4 Meyer 90 3 M 29
5 Waring 90 M	5 Goodman 90 M	5 Thompson 90 1	5 Lohndahl 904 M 40
6 Waring 90 M 4	6 Goodman 9 M	6 Thompson	6 Lohndahl 904 M 40

created by an arteriovenous anastomosis in life. It will be said that the intermittent but constant pounding of the heart and the continuous pressure of the arterial system will gradually break down the obstruction offered by the venous valves and that this pumplike action can with difficulty be imitated. It will also be said that the adaptability of the tissues in the living organism is much greater than in even the fresh cadaver. It is my intention to carry out a series of animal experiments to determine the validity of these contentions. One conclusion, however, is certain, namely, that in that type of condition where arteriovenous anastomosis might be indicated in gangrene or threatened gangrene due to arterial occlusion from angiosclerosis or allied lesions the flow through the pathological arterial system is immeasurably better and easier than it could possibly be through the relatively healthy venous system no matter how extreme the arterial disease may be.

It will be noted that I have laid stress only upon the question of the comparative extent of the peripheral flow through the more or less normal vein and the obstructed artery. I have not as yet considered the problem of the return flow. As will be seen from the experiments the return flow through the veins when the arterial system was irrigated or injected was comparatively normal. In no instance could any return flow be obtained through the artery upon irrigation or injection of the vein. To be sure when the vein was injected there was usually a certain amount of very prompt leakage through immediate adjacent collateral but this was more like a short-circuiting than a return flow from the periphery (Figs. 12 and 13).

One further point should be emphasized, namely, that the veins in my cases were all patent. If the venous circulation is relatively so poor through patent veins how much worse must it be through occluded or partially occluded veins so often found in certain types of these cases?

Summarizing these experiments it will be seen that—

1. A peripheral flow through the patent veins in cases of gangrene due to vascular

disease is only possible to a very slight extent. The valves are eventually an impassable barrier even when the injection is made with extreme force.¹ There is never any capillary circulation.

2. Even if the arteries are extensively diseased the arterial circulation to the smallest capillaries is surprisingly good except in the actually gangrenous areas. The force needed to produce an excellent arterial injection is decidedly less than that required for an imperfect venous injection.

3. The return flow is normal if the artery is injected. If the vein is injected there is no return flow through the artery but some of the fluid may be promptly short-circuited through immediately adjacent tributaries.

Although the above experiments are more or less decisive I determined to make an accurate study of the cases which have been subjected to arteriovenous anastomosis up to date to see if some further conclusions might not be drawn from a study of the clinical material.

The result of this study will be seen in the accompanying table. The cases of Goyanes and Tuffier have been omitted because I believe they are not pertinent to the discussion. Several incorrect and duplicate quotations have also been eliminated.

A careful survey of this table must impress even the most enthusiastic adherents of the operation that very brilliant success cannot be claimed for it at least numerically. I cannot agree with Wieting and Danis that one ought to judge the value of arteriovenous anastomosis only by its successes. An analysis of both the failures and successes will give a much more just valuation.

In a total of 136 published arteriovenous anastomoses or attempts thereat there have been 30 deaths immediately or shortly follow-

There has appeared a paper by Horsley and Whitehead, J. Am. Med. Ass., 9:514, 1912, in which the authors report on the results of a series of animal experiments to determine the utility of arteriovenous anastomosis. These experiments are practically the same as those which I had contemplated performing to see if we were generally to be counted upon for the heart would eventually overcome the obstruction offered by the valves and which I hinted in my body of my paper. The essential result is of course, the same as the result of arteriovenous anastomosis in man. In my section above the system is some later date. A gaseous medium was used for the injection and then a photograph was taken. The result of Horsley and Whitehead is quite the same as I anticipated they could be. The blood returns by the external anastomotic route and there is no real flow through the artery of the limb in every respect but conclusions coincide.

and 11 deaths following an amputation—a total of more than 30 per cent. death due to hock pneumonia from a rapidly progressive

not astonishing when that the degenerated hearts of the patient could poorly stand the changed circulatory conditions serious wound complications expected in these debilitated

Furthermore the patient's easily be placed in jeopardy because of delay in performing an amputation might be life saving. Of the

that did not die 45 have required amputation. The fact that an amputation below the knee has effected after an arterio

anastomosis is no proof of the success of the operation for as is well known such a low amputation is often

successful even in diabetic cases. Almost every case that was examined pathologically showed a thrombotic occlusion at the anastomosis or in the vessel below it. In

cases it was necessary to abandon the operation on account of too extreme occlusion of the lumen or too extensive disease of the wall of the artery or because of thrombosis of the vein. In other words in more than

per cent of the cases the operation or the attempt was practically a total failure although it cannot be denied that some of the cases were evidently hopeless from the beginning and that in other occasionally deterioration or temporary improvement seemed

to occur.

In 8 per cent the result was inconclusive. In one of these (Case 3 of Coenen)—a profunda femoral—internal sphenous anastomosis was tried as an experiment for a varicose ulcer but although the anastomosis was functionated on account of increasing edema the anastomosis was later excised and the vessels

ligated. Case 7 of Hilton and Case 8 of Lillith are too recent to warrant any conclusion. In 6 cases success was claimed in operations on the upper extremity. In 2 of these (Case 1 of Doberauer and Case 2 of Heymann) the results were not conclusive

but even if they were I must agree with Freeman in seriously questioning the successes especially in the upper extremity inasmuch as spontaneous recovery from beginning gangrene of the fingers is of common occurrence. One must admit however that the risk of the operation is decidedly less in the upper extremity.

There remain 24 so called successful arteriovenous anastomoses in the lower extremity in some of which the patient merely survived the operation and the limb only escaped amputation. Case 2 of Ballance died four months after operation from a gangrene of the colon and must be discarded. Case 9 of Davies developed a hemiplegia two months after operation which fact certainly militates against our regarding this case as a successful one. Goodman in a personal communication has informed me that an amputation has since been performed on one of his successful cases. Case 15 of Perimoff was merely a lateral implantation of the saphenous vein into the posterior tibial artery and can scarcely be regarded as a typical example of the operation under consideration. Cases 17 and 18 of Thomson were the both extremities of the same individual who later also developed a hemiplegia for which at the patient's request a common carotid internal jugular anastomosis as suggested by Jaboulay was also performed. These cases are very casually mentioned in a discussion. Cases 19 of Lorta and 20 of Doria are likewise very indefinitely referred to. This leaves 16 successes or about 11 per cent. Of these 11 are reported by four men namely Wieting the main advocate and staunchest defender of the operation Bernheim Goodman and Lilienthal.

I am convinced that this analysis displays the operation in a much more favorable light than the actual reality warrants. It may be safely assumed that practically all the successes have attained publicity but it is quite certain that many failures have been suppressed. Rumors of some of these have reached my ears. Then some of the reports of successful results may have been a trifle premature. That this is possible has recently been pointed out by Buerger who was



Fig. 1

Fig. 1 Injection of anterior and posterior tibial arteries with 50 per cent solution of collargol (crystalline method) for 8 hours. Amputation for diabetic gangrene.



Fig. 2

Fig. 2 Injection of posterior tibial artery with 50 per cent collargol solution (crystalline method) 8 m



Fig. 3

for 44 hours. Limb amputated for diabetic gangrene.

Fig. 3 Irrigation of femoral artery with 50 per cent emulsion of iodine, pyralis oil, and strychnine method. Limb amputated for recurrent sarcoma of femur with spontaneous fracture.

compelled to amputate the limb after an arteriovenous anastomosis reported as successful by another surgeon. It may be of interest to note that he found not only a complete obliteration but true bony formation at the site of the anastomosis.

Granting the correctness of the observations as to improvement (i.e. mainly cessation of pain, arrest of the threatened gangrene, apparent improvement in the sensation, color and temperature of the affected extremity and restoration of the function of the limb) in the so-called successful cases, must we explain this improvement on the basis of a functioning arteriovenous anastomosis? It is common knowledge that just in these cases many methods give similar results. Conservative treatment in general (Stetten) rest in bed, moist dressings, warm saline baths, active hyperæmia or thermotherapy (Hier, Rupke) passive hyperæmia (From

mer) hypodermoclysis of Ringer solution (Koga), alternating hot and cold baths (Borchardt), diathermia (Kowarschik), postural treatment (Buerger) all tend to improve and to a certain extent cure these cases. Further more spontaneous remission often of years duration are not at all uncommon particularly in the thromboangiitis obliterans type. Incidentally the cases of so-called success of arteriovenous anastomoses almost without exception belong to this category. It is extremely likely that some of these factors have played a rôle in many of the reported successes of the Wielsing operation. At any rate it is quite certain that a similar series of cases treated by any of these methods would show as good a percentage of successful result and in all probability a better. There is further no doubt that the mortality would be decidedly lower. In a previous communication I reported a series of 11 unselected cases of

ing the operation and 11 deaths following the operation after an amputation—a total of 41 or a mortality of more than 30 per cent. Death was usually due to shock, pneumonia or sepsis from a rapidly progressive gangrene.

The high mortality is not astonishing when one considers that the degenerated hearts of many of these patients could poorly stand the strain of the changed circulatory conditions and that serious wound complications were to be expected in these debilitated individuals. Furthermore the patient's life might easily be placed in jeopardy because of the delay in performing an amputation which might be life saving. Of the cases that did not die 45 have required amputation. The fact that an amputation below the knee has sufficed after an arteriovenous anastomosis is no proof of the efficacy of the operation for as I well know such a low amputation is often successful even in diabetic cases. Almost every case that was examined pathologically showed a thrombotic occlusion at the anastomosis or in the vessels below it. In 12 cases it was necessary to abandon the operation on account of too extreme occlusion of the lumen or too extensive disease of the wall of the artery or because of thrombosis of the vein. In other words in more than 72 per cent of the cases the operation or the attempt was practically a total failure although it cannot be denied that some of the cases were evidently hopeless from the beginning and that in others occasionally demarcation or temporary improvement seemed to occur.

In 8 cases the result was inconclusive. In one of these (Case 3 of Coenen)—a profunda femoris—internal saphenous anastomosis was tried as an experiment for varicose ulcer but although the anastomosis functionated on account of increasing edema the anastomosis was later excised and the vessels ligated. Case 7 of Tilton and Case 8 of Grant are too recent to warrant any conclusions. In 6 cases success was claimed in operations on the upper extremity in 2 of these (Case 1 of Doberauer and Case 2 of Heymann) the results were not conclusive

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I am convinced that this analysis displays the operation in a much more favorable light than the actual reality warrants. It may be safely assumed that practically all the successes have attained publicity but it is quite certain that many failures have been suppressed. Rumors of some of these have reached my ears. Then some of the reports of successful results may have been a trifle premature. That this is possible has recently been pointed out by Buerger who was

diabetic gangrene treated by a routine conservative method. Only 5 of these patients died and 9 were cured without amputation.

In addition to the above von Oppel and others (Hauke Coenen Hesse Moszkowicz Lidski Sokoloff Fedorowitsch Babitzki Pikin Lilienthal Van Beuren) have shown that a ligation of the femoral vein below the saphenous opening by impeding the venous return increases the pressure in the capillary system and in the arterial collaterals. This theoretical conception has been put to a practical test in quite a number of cases and the results are vastly more satisfactory than those of arteriovenous anastomosis. Moreover as far as I can discover there have been no direct fatalities. Lilienthal has even had a successful result after simple multiple ligation of superficial varicose veins. If these observations on ligation of the femoral vein are correct it is very probable that one of the main factors of success in arteriovenous anastomosis is merely the impeded venous return. Strong presumptive evidence to this effect is found in a number of cases in which arteriovenous anastomosis was performed where in spite of the fact that the anastomosis obviously did not functionate on account of thrombosis (negative Cases 2 of Tuffier and 4 and 5 of Bernheim) there was a decided amelioration in the symptoms. If these conclusions are warranted venous ligation is a much more rational procedure because it is not only a much simpler and safer operation but the already imperfect arterial circulation is not further interfered with.

It should also be emphasized that in all the successful cases a laterolateral anastomosis was performed or else if the artery was divided this was done below the point at which the profunda is given off. In other words the arterial circulation was not dis-

turbed at all or else an ample collateral circulation was always possible. This fact rather justifies the suspicion that the extremity was saved not because of the operation but rather in spite of it. At any rate it certainly seems that the operation is likely to do more harm than good and that the slim chances of recovery that these cases have are entirely destroyed unless the arterial circulation is not too extensively disturbed.

I do not wish to be construed as denying the possibility of establishing a permanent arteriovenous anastomosis. From clinical pathological and experimental sources ample evidence is found that this can be done. The dilatation of the veins or the occasional persistent venous pulsation thrill or bruit (Bernheim Goodman Vaughan Neal) is convincing proof that the anastomosis is functioning. Arterial bleeding through the veins during amputation (Hubbard Wieting) even with spurring (Bernheim) is further presumptive evidence in favor of this. In a few of the failures that came to pathological examination a perfectly patent anastomosis without thrombosis was found even some time after the operation (Jaboulay Goodman). From an experimental standpoint the matter is settled beyond all dispute. Since Gluck in 1898 first performed a successful carotid jugular anastomosis many have succeeded in establishing permanent arteriovenous communications in various vessels. Among others who have done this may be mentioned Carrel with Morel and Guthrie following his failure with Bernard Watts Tuffier Trouin Hadda Dani (carotid jugular and femoral) Leriche (splenic) Franz Bernheim Yamanouchi and Janu and Moller (femoral). Direct observation on the flow of blood immediately or a short time after operation (Cottard and Villandre)

Fig 4. Ligation of femoral vein below saphenous opening. I of lead in paraffin oil. If not cured in 10 days, amputation below the point of ligation.

Fig 5. Ligation of femoral vein below saphenous opening. I of lead in paraffin oil. If not cured in 10 days, amputation below the point of ligation.

Fig 6. Ligation of femoral vein below saphenous opening. I of lead in paraffin oil. If not cured in 10 days, amputation below the point of ligation.

Fig 7. Ligation of femoral vein below saphenous opening. I of lead in paraffin oil. If not cured in 10 days, amputation below the point of ligation.



Fig 2 Forcible injection of posterior tibial vein with 50 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for senile gangrene.

has no great scientific significance. Finally the occurrence of congenital pathological or traumatic arteriovenous aneurisms is proof conclusive that a fistulous communication between artery and vein is possible.

My contention is that even granting the possibility of establishing a permanent anastomosis between artery and vein which as we have seen from the many failures is a difficult proposition for technical reasons this anastomosis is of no value in bringing more blood to the periphery. That is proved practically by the failure of the operation to save the limb in spite of an actually patent anastomosis (Jaboulay Goodman) or of arterial bleeding through the veins at amputation (Hubbard Wieting, Bernheim). Rather do



Fig 3

Fig 3 Forcible injection of femoral vein with 50 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb re-amputated for senile gangrene.



Fig 4

Fig 4 Injection of femoral artery with 5 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for senile gangrene. Same extremity as Fig 3.

I believe that a successful anastomosis may in the end be more harmful than a thrombosis at the site of operation which might act as von Oppel's ligation. If one succeeds with the anastomosis one really produces an arteriovenous aneurism and perhaps all the evils that accompany this distressing malady: i.e. the varicosities, oedema, ulceration and eventual elephantiasis. Aside from any other consideration there is not just an element of surgical hysteria or at least of lack of judgment in the desire to produce for therapeutic purposes a lesion which when found as a pathological entity invariably demands operative intervention for its relief and frequently urgent intervention at that?

I a priori it might be observed that several experimenters among others Carrel and Guthrie, Watts Unger and Bethmann have noted eventual sclerotic changes in the wall of the vein with a tendency toward obliteration after successful arteriovenous anastomosis due probably to the effect of

Fig 5 Forcible injection of popliteal vein with 50 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for diabetic gangrene.

Fig 6 Injection of popliteal artery with 50 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for senile gangrene. Same extremity as Fig 5.

Fig 7 Forcible injection of popliteal vein with 5 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for senile gangrene.

Fig 8 Injection of popliteal artery with 50 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for senile gangrene. Same extremity as Fig 7.



the abnormal arterial pressure upon the vein. Although this has been disputed by Levin and Larkin the likelihood certainly seems to exist. If this is true another nail has been put into the coffin of arteriovenous anastomosis.

I cannot refrain at this point from entering a protest against the adoption of the term reversal of the circulation so frequently used even in the latest publications on the subject. To be sure as authoritative an investigator as Carrel claims that this is experimentally possible i.e. that arterial blood can reach the periphery through the vein and return through the artery. Incidentally Carrel claims that this is only possible in a terminoterminal anastomosis and cannot occur in a laterolateral operation which today according to Bernheim and Wieting should be the operation of choice. Without entering into the merits of his contentions which by the way are based on one experiment of five hours observation and which are opposed by the vast majority of even those experimenters who have succeeded in establishing permanent anastomoses and admitting the possibility in the dog there is certainly no evidence that this can occur in the human. Let us grant that the valves or at least some of them can be forced. Let us also admit that possible variations in the veins may permit a retrograde flow or as Gallois and Pinatelle and Wieting suggest that the valves are incompetent in certain cases due to old age or disease although the authority for this latter suggestion (Klotz) studied only the saphenous vein which presents an entirely different problem. At any rate in my experiments the majority of which were made on extremities of elderly individuals with vascular disease there is no special evidence that the valves in the deeper veins are inefficient. Even conceding however

that for one or the other reason a backward flow through the veins is possible there is nevertheless no evidence of a reversed capillary circulation. As Ricard and Delbet and others maintain the best that can be said for the circulatory conditions is that the blood might reach the periphery and then return through collateral venous channels so that the tissues are bathed in an intermittent wavelike flow (Jeger). The blood will surely return from the periphery through the first venous tributary or its numerous anastomoses even if the valves above have been forced. It is surely easier for the blood to return this way than to force further valves or to overcome the resistance offered by the capillaries. This fact was most beautifully demonstrated in my Experiments Nos. 12 and 13 both during the performance of the experiment and by the subsequent radio-graphs (Figs. 12 and 13). Finally even admitting that the blood may reach the capillary network it could not by any possible chance return through the diseased artery. Even the enthusiastic Wieting admits the absurdity of this contention. If the vessel is so obstructed that the circulation is insufficient with normal or even high arterial pressure a return flow through this same vessel under low venous pressure is obviously out of the question. Merely for the sake of completely clinching the argument it might be added that in the majority of even the successful cases the artery was actually ligated below the anastomosis.

It has been claimed by Wieting that most of the failures have been due to improperly placed indications. Without going into detail Wieting advises operation only in cases where the general condition of the patient, the extent and progress of the circulatory disturbance and the state of the vessels themselves are all relatively favorable. To

Fig. 5. Lateral section of iliac vein with 50 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for recurrent sarcoma of humerus and shoulder.

Fig. 6. Lateral section of axillary artery with 50 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for recurrent sarcoma of humerus and shoulder. Same extremity. Fig. 5

Fig. 7. Forearm injection of popliteal vein with 50 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for gangrene due to thrombo-angiitis obliterans.

Fig. 8. Lateral section of popliteal artery with 50 per cent emulsion of red oxide of lead in paraffin oil. Hand syringe method. Limb amputated for gangrene due to thrombo-angiitis obliterans. Same extremity as Fig. 7.

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my mind that type of case would be just suitable for non operative treatment. At any rate a questionable and somewhat dangerous surgical procedure would certainly not be warranted. In diabetes where all complicated operations are frankly contra indicated arteriovenous anastomosis should certainly not be done. In senile gangrene the calcareous degeneration of the artery is usually so marked that suture of the rigid thromatous vessel is out of the question. If the disease of the artery is not advanced the operation is surely not indicated. In cases of thrombo-angitis obliterans as Buerger in his classical studies of the disease has shown the veins are very frequently diseased and obliterated as the arteries this applies not only to the deep but also to the superficial veins. Admitting the claims of the adherents of the operation that a peripheral venous flow is possible and that the return flow takes place through the anastomoses of the collaterals with the superficial veins the operation must needs be unsuccessful if either the deep or superficial veins are occluded. From the above it would seem that the indications for the operation admitting its possible utility are decidedly restricted.

It might be pertinent to the question under discussion to call attention here to the fact that the occurrence of gangrene although usually not always due to mere arterial obstruction and impoverished circulation in my previous paper on the treatment of diabetic gangrene I reported several cases of extensive gangrene of the lower extremity in which the posterior tibial or dorsalis pedis pulse or both were distinctly palpable. In one instance severe arterial hæmorrhage occurred through the sloughing wound of the foot. Buerger has noted similar phenomena in cases of thrombo-angitis obliterans. In treating such cases nothing could be more logical than the performance of an arteriovenous anastomosis.

From the preceding I think it must be conceded that the utility of arteriovenous anastomosis as a therapeutic measure is open to grave question. I believe that I have effectually shown —

1 That the arterial circulation to the periphery even in very advanced arterial disease is in every respect better and easier than the retrograde venous circulation mainly because of the obstruction offered by the valves and the short-circuiting of the blood through anastomoses of neighboring venous collaterals.

2 That the operation is dangerous and the results have been most unsatisfactory except in a very small percentage of cases.

3 That the few so-called successful results have probably been obtained more in spite of than because of the operation inasmuch as various factors play a rôle in the improvement of these cases as improvement has been recorded after definite closure of the anastomosis and as failure has occurred with perfect patency of the arteriovenous fistula.

4 That even if the anastomosis functionates which it rarely does there is no possibility of circulatory improvement but rather quite the reverse.

5 That the term reversal of the circulation at least as far as clinical cases are concerned is absurd.

6 That even if the usefulness of the operation were proved beyond question the possible indications would be restricted to an unappreciable minimum.

I therefore feel that the scepticism of Lejars, Lenormant and Wettstein is a trifle too mild. Even Coenen is not quite emphatic enough to my mind. I rather agree with Guthrie who although having once claimed to have shown with Carrel the possibility of reversal of the circulation in the limb of a dog deplors the fact that arteriovenous anastomosis should have been applied to the human being for circulatory disturbances of the lower extremity and prophesies its failure. For I believe that it is very questionable if the operation is ever justified. I do not think that I am going too far in advising that this procedure be entirely eliminated from our surgical repertoire.

In conclusion I desire to acknowledge my indebtedness to all the gentlemen of the surgical staff of the German Hospital who so kindly placed their material at my disposal.

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LOCAL INFECTION DUE TO INTRAVASCULAR DISSEMINATION OF BACTERIA THE ASSOCIATION OF DIPHTHEROID BACILLI WITH VARIOUS DISEASE CONDITIONS¹

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IN this paper I wish to record certain results which indicate that the embolic origin of infection is far more common than has been believed in the past that a certain type of thrombosis is apparently due to a particular diplococcus and results of cultures from the blood and other tissues together with illustrative cases which indicate that diphtheroid bacilli may be the cause of certain unusual forms of infection.

The hæmatogenous origin of infection in regions which do not normally harbor bacteria such as the endocardium pericardium joints and bone is accepted. The mode of origin of appendicitis ulcer of the stomach cholecystitis and other infections in regions normally harboring bacteria is not so clear and is usually considered a local invasion even where the clinical facts suggest an hæmatogenous origin. Until recently this view was held because of the meager experimental evidence that they may be produced by intravenous injection. In some experiments which I have performed recently the importance of the blood stream as a carrier of infection is very evident and the elective localization of streptococci from appendicitis ulcer of the stomach cholecystitis and rheumatic fever in the respective organs occurs commonly with the strains soon after isolation while later they lose this affinity entirely.

The tendency of the streptococci from rheumatic arthritis to infect over a wide range is shown in the animals just as is observed in man. The details of the results of these experiments are reserved for other papers.

By the application of improved methods it is certain that the blood stream is invaded far more frequently than has been known in the past. The mechanism of the entry of bacteria into the blood stream is not entirely clear. The importance of large thrombi in this connection however is evident. The

common occurrence of typical septic temperature in cases of sinus thrombosis for example where the bacteria grow in the thrombus and intermittently invade the blood suggests that a similar mechanism causes puerperal sepsis or the septic fever which sometimes follows appendectomy for example where there is no evidence of gross thrombosis or abscess formation. In some instances there seems to be an adaptation which allows the microorganism to enter and grow in the circulation where little or no local disturbance exists.

The important rôle of infection as the cause of thrombosis is very apparent from McClean's experiments and is always very evident clinically and anatomically in those cases where there is softening of the thrombus and suppuration in the region where emboli lodge. Here as in the experiments of McClean bacteria of a relatively high grade of virulence are responsible. The cause of the formation of post operative thrombi following herniotomy or appendectomy for example where they form in other regions than the field of operation producing little fever or other symptoms but giving rise commonly to fatal pulmonary embolism is not so clear. I have had opportunity to make cultures from the blood or thrombus or both in a number of these cases. A pure culture of a Gram positive relatively avirulent short chained non encapsulated green producing diplococcus has been isolated from one case of primary portal thrombosis from four cases of fatal post-operative pulmonary embolism following appendectomy herniotomy and hysterectomy from the blood in two cases of thrombosis following labor (both of which recovered) and from the blood in one case of quite generalized venous thrombosis which began in the iliac veins in a case of sarcoma of the pelvis with marked pressure. The same

organism was isolated in almost pure culture from the thrombus in the pulmonary artery which caused the death of a patient following a post operative peritonitis. The cultures from the peritoneal exudate showed mostly hemolytic streptococci but also a few of the above green producing diplococci.

Intravenous injection of the strain from the case of portal thrombosis produced thrombosis in the portal vein in rabbits. It seems therefore that cases of thrombosis in which there is little or no fever which occur commonly a week or ten days after anesthesia or operation the time when the blood coagulates rapidly as shown by Hamburger and Ewing¹ are associated commonly with a particular organism. The fact that the thrombus forms often in regions other than the place of trauma and in cases where no apparent infection exists emphasizes the importance of searching for and removing if possible foci of infection which are known to harbor similar organisms such as the tonsils and pus pockets about the teeth, a point not yet sufficiently recognized. The etiologic rôle of the organism can scarcely be questioned but apparently it can produce thrombosis only when the coagulability of the blood is high and when a certain amount of stasis exists.

The exact relation of diphtheroid like bacilli to disease in man is not well understood largely because when injected into animals they frequently show little or no pathogenic powers. That they produce disease however in some instances is certain because Ghon and others have demonstrated them in the vegetations of certain cases of endocarditis and I have shown their presence in the blood and the nodes of erythema nodosum and have produced similar lesions in animals by intravenous injection. From the following cases the idea that a similar variation in the pathogenic powers of the organisms exists as found in the streptococcus group receives some support.

Blood cultures made by the usual technique rarely yield these organisms. By means of a method² however in which due regard is paid to the question of oxygen pressure I have

succeeded in isolating this type of organism in pure culture from the blood during life in two cases of erythema nodosum two cases of exophthalmic goiter in four cases of Hodgkin's disease during the febrile period in two cases of endocarditis in one case of rheumatism and in two peculiar fatal cases of purpura hemorrhagica. The two cases of purpura which occurred in the practice of Drs Webster and Wells had a similar history. Pericarditis was present in both marked hemorrhages of the skin and mucous membrane occurred the fever was never high leucocytosis was slight or absent but there was marked mental and cardiac disturbance from the beginning. Both had some disturbance of the teeth previously and in one the same organism as was found in the blood was isolated from a suppurating sinus at the root of an abscessed tooth.

The results in the following case are of interest.

A girl 4 years a case of Dr Miller's had a bronchopneumonia following a severe cold from which she apparently recovered, but April 4, 1914 five days previous to making the blood culture there was discovered a mitral murmur associated with return of some fever. The day after making the blood culture she developed arthritis but ultimately made a complete recovery. The blood culture showed a pure growth of a diphtheroid like bacillus which produced when injected into a rabbit marked hemorrhages in the lungs and bronchopneumonia, a multiple non-suppurative arthritis, endocarditis, pericarditis, myocarditis and a localized infection in the muscular coat of the stomach.

A diphtheroid bacillus was found in the abscess of a tooth in the blood in the erythematous node of the skin of the forearm during life and in the vegetation and acute ulcers of the stomach in a case of acute fatal arthritis following extraction of abscessed teeth in a patient of Dr Billings. The abscesses were the source of infection of the chronic arthritis which was present for some years previously.

The findings in a patient of Dr Whitaker are of interest.

For the past two years the patient a man of 7 years has had occasional disturbances of stomach accompanied by pain. Six months ago he had an attack of dullching pain in the epigastric region which was continuous and accompanied by nausea and constipation and relieved by sitting down or lying on his back and temporarily by taking food.

This attack lasted seven days and then disappeared. An exactly similar attack occurred ten days before he was given in the late forenoon of October 26 osteopathic manipulations of the abdomen. Three hours later he was seized with a violent pain in the epigastrium which doubled him up the abdomen became tense the temperature was subnormal the pulse rapid and irregular there was marked pallor. A diagnosis of perforated duodenal ulcer was verified the same night at operation by Dr Whitaker. A large accumulation of pus had already taken place. The small perforation in the indurated ulcer (2 x 1.5 cm) on the anterior surface of the first portion of the duodenum was closed and drainage established. Ten days later the patient developed an annoying dysentery but this disappeared in a week. The symptoms referable to the ulcer gradually subsided but he developed a typical septic fever accompanied by marked and exhausting sweats weakness and emaciation which gradually grew worse. After some weeks of the septic fever the patient developed severe pain in the middle portion of the femur and circumscribed red tender symmetrically placed nodules along the course of the subcutaneous veins in the forearm.

On December 18 Dr McArthur saw the patient

and suggested having a blood culture made to determine the cause of the sepsis since examination of the abdomen was quite negative. The pus which I expressed from the tonsil yielded a predominating and large number of diphtheria like bacilli together with some streptococci while the blood yielded a pure growth of a similar bacillus. A vaccine prepared from the diphtheroid bacillus obtained from both regions was followed by a disappearance of the septic fever and the pain in the femur and the nodules on the forearm disappeared the appetite became marked and he made an uninterrupted recovery.

From a consideration of these findings the idea that a similar variation in the pathogenic powers of the diphtheroid group of organisms exists as in the streptococcus group receives some support. However the possibility that the diphtheroid bacilli are mere secondary invaders must be considered seriously until definite experimental proof has been brought forward that they are actually the cause of each individual disease.

A CASE OF CHORIO-EPITHELIOMA MALIGNUM COMPLICATING A TWO-MONTHS PREGNANCY AND A DEGENERATED UTERINE FIBROMA¹

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WHETHER chorio epithelioma malignum is a rare disease or more common than the literature would indicate as many writers state I will not attempt to discuss here at length. But we know that less than 500 cases are thus far recorded. Judging from its onset which is often sudden with death ensuing rapidly and because of the failure of many to study carefully curettings and autopsy specimens and because of the lack of suspicion as to the nature of the disease on the part of the attendant noted so frequently in the recorded cases, I believe many unrecorded cases have occurred. In none have I found complications reported which were similar to those in the case here recited nor in such an early pregnancy none with so little symptomatology. It has been found com-

plicating fibroids but with severe symptoms notably hemorrhage. In my case no hemorrhage occurred. Nor has it been found complicating an early pregnancy without symptoms as in the case I here report.

It will be noted that my patient had been pregnant last thirteen years before and had aborted without incident at six weeks and that no menstrual or pelvic symptoms followed until after pregnancy began in July last and even then nothing indicated an abnormality other than the fibroid complicating pregnancy.

It may be said then that I report this case *first* because of its early discovery, *second* its complicating an early (six weeks) normal pregnancy, *third* it also complicates a degenerated uterine fibroid, *fourth* it has no symptomatology, *fifth* it was removed

early and perhaps entirely and *sixth* that while the growth had passed from the villi into the uterine muscle microscopical study of the uterus and absence of symptoms fail to indicate the existence of metastasis

The history of the case is as follows

Mrs F K white 41 years resident of Wilmington Delaware consulted me September 25 1914, for the presence of an abdominal tumor that had recently been the seat of severe pain She had been married eighteen years and had given birth to two children now aged fifteen and fourteen years respectively Thirteen years ago her only other pregnancy terminated in an abortion at about the sixth week Her menstruation had always been regular until May 23 when it was delayed a few days but continued the usual three days In June it was a little more delayed but lasted the usual three days July 23 to 25 the last period was six days late Her periods were always painless and moderate in amount

No vesical symptoms except frequent urination had supervened She had not suffered from constipation but about August 25 she had vomiting and purging for two days followed by constipation and purging alternately to date The vomiting had suggested morning sickness though it frequently occurred in the evening The vomiting and amenorrhoea had caused a suspicion of pregnancy but the pain in the tumor had alarmed her A surgeon in Wilmington had diagnosed a tumor and possible pregnancy and advised removal of tumor

Examination The patient is a well nourished plump woman No breast changes of pregnancy are detected In the abdomen a mass is felt extending from the pubes to umbilicus and from the midline to the extreme left side of the cervix It is hard but tender and somewhat movable The cervix is softened and another mass movable and dense much smaller than the one previously described is found to the right It is found firmly attached to the cervix It is thought to be the uterine body pregnant and displaced upward and to the right by the left tumor or a pregnant right horn of a bicornate uterus and a degenerating fibroid in the left one Neither appendage is recognized Operation was recommended and performed next day The body of the uterus and a necrobiotic uterine fibroid (the left mass) and the vermiform appendix were removed No adhesions were encountered and the normal appendages were not disturbed The specimen was opened the tumor showing the changes mentioned and the uterine body containing a fetus of about six weeks development The uterine cavity was not laid open sufficiently to expose more than the fetal sac and its contained fetus The uterine body was but a projection from the tumor and myomectomy was discarded After the operation was finished a hospital interne split the uterine body widely and

discovered the chorionic changes before sending the specimen to the laboratory There Dr J B Briggs, professor of pathology after many sections reported it as chorio-epithelioma malignum that was present in the removed tissues only in the chorion and attached portion of the uterine wall

October 14 the cervix was removed *per vaginam* and Dr Briggs reported it free of the disease The appendages were not removed The patient was examined December 14 1914, and bore no evidence of the presence of the chorio-epithelioma.

Report of Dr Briggs Tissue received September 26 1914 and October 14 1914 Clinical diagnosis, chorio-epithelioma malignum Remarks Many sections of the fundus cornua body and neck of uterus were made No invasion of syncytioma was found in these regions It was in one section only which was made between what appeared owing to the distortion due to the fibroma to be the apex of the fundus and the left cornu that any trace of invasion of maternal tissue was discovered In this region alone definite syncytial growth showing particularly the characteristics of Langhans layer intruded upon the maternal tissue No peritoneal invasion was discoverable nor were any metastases found in neighboring organs

DEFINITION OF CHORIO EPITHELIOMA MALIGNUM

Chorio epithelioma malignum is a form of malignant neoplasm that occurs in both sexes though much more frequent in females than in males It usually arises from pregnancy often from leaving behind fragments of chorionic tissue normal or abnormal which have been retained from a pregnancy which either went to full term or terminated in miscarriage or abortion and particularly if degeneration of the placenta or chorion into a hydatid mole has occurred It may occur in women before (Pick's case 16) or long after (Devotzky's case 6) the procreative zone of the life of woman It may be found in men in organs most subject to teratomatous formation (Schlagenhauser's 2 cases 20 and Emanuel's cases, 8) as the testicle and mediastinum and that it may also be found in the testicle independent of teratomata (von Hansemann 11 and Emanuel) In man it is nearly always of teratomatous origin though cases have been carefully studied and reported as being entirely free of teratoma

HISTORY

To quote from Caturani's (2) valuable monograph on chorio-epithelioma and other

papers on the subject Netzel in 1872 Mayer in 1876 Chiari in 1878 Hofmeyer in 1885 and Mayer in 1888 observed and reported a disease similar to chorio epithelioma but its nature was not clearly understood until Sanger (17) in his paper before the Leipzig Obstetrical Society July 16 1888 described a tumor differing absolutely from any known tumor and emphasized its peculiar relation to pregnancy He stated that the microscopic examination showed it to be a very hæmorrhagic tumor made up of cells similar to those found in the decidua and was a malignant metastasizing deciduoma

He described the case more fully before the German Gynecological Society in 1892 (18) In 1893 (19) he made it the nucleus of an exhaustive monograph published in the *Archiv für Gynäkologie* In 1889 Pfeiffer (15) a pupil of Chiari (3) ignorant of the work of Sanger described a similar case calling it deciduoma malignum and stated that Chiari (3) now regarded the three cases he had reported two years before as carcinoma of the uterus following the puerperium as identical with the one Pfeiffer was reporting Gottschalk (10) thought it of foetal origin and the tumor sarcoma of chorionic villi

J Whitridge Williams (23) called attention to the emphatic presence of chorionic structures in his specimen thus differing from Sanger's case Appelstedt and Aschoff (1) in 1896 still further emphasized the fact that chorionic tissue was the essential feature of such tumors and two years later Marchand (14) clearly demonstrated that all such tumors were from the layer of Langhans and contained syncytial tissue and therefore were chorionic and not decidual in origin He called the new growth chorio epithelioma a name that has been universally adopted In some instances the new growth has been found only in the chorion and therefore is not considered malignant This has led many to add to the name the qualifying word malignum which is really superfluous

such as the uterine or vaginal wall may be rounded much like a polyp In the vaginal wall the masses of this form of tumor are distinctly nodular

In metastases in the lung liver kidney spinal cord or ovary it may assume various shapes though usually it is nodular At all events it is soft and has the appearance of having been subjected to some form of traumatism and blood clot about it is always noted It essentially contains quite well arranged cells from the syncytium and Langhans layer In many villi are distinctly seen though to a less extent in the metastases and I believe never in the male

The primary tumor if in the uterus may attain such size as to be mistaken for a uterus pregnant seven months but is more apt to be small In fact the uterine condition primary focus may be entirely overshadowed by vaginal metastases of much greater size

METASTASIS

By no means is there a thorough agreement among pathologists regarding the danger and time of metastasis Many believe that fragments of the villi are carried through the blood-channels to other parts even in normal conditions and in many cases the first and only evidence of the disease is in metastases found principally in the lungs In such the primary focus may not be easily located if various organs are involved Certainly if the uterus is at the time free of the disease it cannot be regarded as the primary focus Moreover in a few cases fatal in result the growth has been recognized in the chorion with metastases in the vagina or the lungs and abdominal viscera and the uterus not invaded

While the new growth usually begins in the uterine gestation contents and invades the uterine wall and later metastasizes we have just referred to the evident passage through the blood-channel of fragmentary villi that find lodgement and perhaps after a long period of quiescence become malignant

VARIETIES OF CHORIO-EPITHELIOMA

Besides the variety the identity of which was definitely established by Marchand in

STRUCTURAL CHARACTERISTICS OF CHORIO EPITHELIOMA

The tumor is usually dark gray or nearly black in color and if attached to a surface

1898 and proclaimed to be absolutely a result of pregnancy two cases were reported by Schlagenhauser in 1902 of malignant tumors of the testicle in which he had found chorio epitheliomatous elements viz syncytial masses and groups of Langhans cells. In 1904 Emanuel collated fourteen such cases and described one of his. The close resemblance of the chorio-epithelioma was indicated by the presence in some of them of cystic bodies which from both the microscopical and naked eye appearance resemble the hydatid mole vesicles. Schlagenhauser believed and his opinion is generally accepted that the peculiar foetal ectodermic tissues found in these testicular tumors were derivatives of embryonic relics belonging to the stage of development in which chorionic tissue is so abundantly produced. Similar tumors have since been found in various parts of the body in which teratomata abound. But further another variety was found in man—a pure chorio epithelioma having no usual characteristics of dermoids or teratoma, but which consisted solely of blood clots fibrin and the essential plasmodial and cellular elements. It was not to be distinguished from the chorio-epithelioma found in the uterus and vagina. Von Hansemann's case reported in 1904 was of a tumor of the testicle with metastasis to the abdominal viscera and was described as follows. All the growth consisted of fibrin and blood clot with much leucocytic infiltration running through the blood clots are grayish strands of tissue which consist of Langhans cells and syncytium. Emanuel recorded a similar case. Eden (7) considers them also of teratomic origin. Eden also believes that chorio epithelioma of teratomic origin can also occur in the female in whom pregnancy cannot possibly enter into the etiology. He quotes two cases to substantiate this view. The first was that of Pick which was that of a girl of eight and one half years in which menstruation had never occurred and from whom was removed an ovarian tumor consisting mainly of typical teratomatous structures but which in parts showed typical chorio epitheliomatous elements some of the sections exhibited being indistinguishable from Marchand's tumor.

He states that this case of Pick obviously reproduces all the essential features of the testicular growth recorded by Schlagenhauser and others and may nay must be explained upon the same hypothesis.

Although the age of Pick's patient does not positively preclude pregnancy the general teratomatous characters of the tumor removes all objections to be raised on that score. Devitzky has a very remarkable case that also is used quite reasonably to support this theory.

It was of a woman 75 years of age who was admitted to the gynecological clinic of the University of Moscow (Professor Michael Nikiforoff) October 1 1903. She had been having irregular uterine hemorrhage for two years dyspnoea, cough bloody expectoration and painful micturition of recent onset. The menses ended at the age of 55 years and had always been regular. She presented the anatomical signs of virginity and firmly denied she had ever been pregnant. While in the clinic micturition was painful and frequent and the urine contained 5 per cent albumin the bloody expectoration was profuse the abdomen was distended (circumference 45 inches) although general emaciation was notable. A uterine tumor was diagnosed as an interstitial fibroid and curettage was done the 8th and the sound entered 15 cm cardiac failure general oedema partial anuria and death the 19th. Microscopic examination of curettings showed hypertrophic glandula endometritis but no trace of malignancy. Autopsy findings October 20 (1) Old standing pleuritic adhesion with numerous rounded masses of new growth distributed through both lungs and similar nodules in the bronchial glands. (2) Enlargement of uterus from very large number of hard nodular fibroid tumors from mucosa to serosa the uterine cavity empty and wall smooth. (3) In posterior wall of the bladder was a dark red rounded growth a little elevated above the general mucosal surface irregular and ulcerated upon the surface with incrustations of salts. (4) In the wall of the sigmoid flexure was found a small dark red nodule. The tubes ovaries vagina external genitals and abdominal viscera were generally free from disease. Thorough microscopical study of nodules in bladder wall sigmoid and lungs showed all contained the same minute structure: (1) blood clot fibrin and debris (2) masses of syncytium (3) collections of round and polygonal cells resembling cells of Langhans (4) numerous large giant cells and cells of intermediate types. All the well known and characteristic elements of the chorio-epithelioma were present. The syncytial and cellular masses also showed the marked tendency to invade blood vessels and even to form thrombi in them always regarded as one of the typical features of chorio epithelioma.

Eden says Here are two authentic cases and at the extremes of life with the primary growth in one in the ovary and in the other in the bladder and in both the uterus vagina tubes and external genitals were not involved He regards these as teratomatous cases the same as occur in the male

But Devitzky's case differs from all the others by having its primary site in a structure that is not regarded as one in which dermoids or teratoma are found Eden says he finds no record of a dermoid in the bladder Devitzky rejecting the teratomatous theory as to origin of the tumor in his case thinks it arose from a wolffian duct Eden thinks it may have arisen from the vesical mucosa by metaplasia

Thus it is shown chorio epithelioma exists in at least two forms one arising from pregnancy and the other occurring in either sex of teratomatous origin

CAUSES

Some changes in the chorion bring about this malignant disease which follows molar pregnancy in from 36 to 41 per cent of cases normal gestation 22 to 28 per cent abortion 31 to 33 per cent and from 2 to 7 per cent in ectopic gestation

DEGREE OF MALIGNANCY

Schmauch (21) and others have decided that the presence of plasmodium when not connected with a villus must always be regarded as a sign of malignancy The assemblage of well defined cell of the character of those forming the Langhans layer no matter what size or form amongst healthy tissues or true plasmodium is when found several months after expulsion of the ovum an unmistakable sign of boundless growth Leacher (22) says the degree of malignancy is less when villi are present As villi are not present in the metastases they might be considered exceedingly virulent And yet all are agreed that removal of a primary growth in the uterus generally lessens or abolishes the malignant feature of the metastases, and vice versa Even curettage may remove the primary focus in the uterus, but the literature case record do not appear to

support this plan of treatment as the malignancy has not been materially lessened by that plan

Strangely enough partial removal of primary uterine foci (voble) has resulted in cure Perhaps the degree of malignancy depends on the origin of the primary growth Findley (9) states that 16 per cent of hydatid moles are malignant while others think the full term pregnancy is more potent in that respect No doubt the malignancy is of a high order yet less so than carcinoma of the cervix or even of the body of the uterus As a rule however the disease is not recognized early as apparently it is capable of very rapid early advancement Perhaps normal pregnancy delays the symptoms of hemorrhage one of the most constant early symptoms and as a result the disease is beyond eradication before discovered L P Davis (5) says there are but two known cases of spontaneous cure

TIME OF DEVELOPMENT RELATIVE TO PREGNANCY

Various authors have attempted to glean data on this feature in tables of cases In Ladinsky's (13) statistics the average is eight weeks after molar pregnancy seven weeks after abortion and five weeks after pregnancy at term That it may occur or be recognized much earlier cannot be doubted In my case it was incidentally found in a uterus containing a normal fetus at the end of six weeks gestation *In contraire* in Catu-rani's first case the disease lay dormant five years after a mole was passed

SYMPTOMS

The chief symptom of chorio epithelioma of the uterus is hemorrhage which is apt to be repeated and usually a few weeks after a full term labor an abortion or the removal from the uterus of a molar pregnancy there may be fragments of the growth passed The uterus may contain a pregnancy that is apparently progressing normally and nodules soft dark gray in color and later bleeding freely be noted in the vagina Metastases to lungs, liver kidney brain or cord will give symptoms referable to those respective or

gans Usually pulmonary metastases have been mistaken for pneumonia. A primary focus in an ovary or the bladder may give symptoms referable to those organs and even the cystoscope may assist in discovering and noting the characteristics of the new growth in the bladder.

DIAGNOSIS

As chorio epithelioma is so constantly associated with pregnancy either coincidental or following and its chief symptom hæmorrhage one often associated with some of the most frequent complications of pregnancy labor at term and abortion it is likely not to be considered early in the case. The disease is of a nature so serious that uterine hæmorrhage of a persistent type occurring a few weeks or months after labor at term an abortion or a molar pregnancy should recall it to us. If nodules having the characteristics mentioned suddenly appear in the vagina at any time and especially during pregnancy or just after one has terminated in full term labor abortion or the passage of a hydatid mole and more particularly if symptoms appear that might be attributed to other metastases, then greater suspicion of the presence of this disease is proper. Rapid enlargement of the uterus (without reason to suspect pregnancy) into a doughy and perhaps fixed mass or enlargement of a too rapid or a too slow speed to conform to a known pregnancy may also suggest this disease. The microscopical examination of the tissues of chorio epithelioma is sufficiently characteristic and constant as to leave little doubt.

PROGNOSIS

Kromer (12) has shown that but two cases have recovered without operation. Childress (4) has from a collection of 455 cases found that 68 per cent recovered after early radical operation after molar pregnancy 58 per cent after abortions and full term deliveries and 33 per cent in ectopic gestation cases. Teacher collected 188 cases in which radical operation was performed 99 times with 63.3 per cent recoveries. Childress found recurrences in 11 per cent in from six months to two years none of the series having been reported after two years.

Studying the case histories recorded one is impressed by the many delayed operations and subsequent and fatal recurrences. Improvement lies in greater importance being accorded this disease and earlier operations. Clinical evidence will usually be our guide, the microscope affording confirmation.

TREATMENT

The treatment should consist of early operation as this is a disease that migrates through the large channels—blood vessels—metastases may be expected to occur early and particularly if curettage is done. I believe strong suspicion of the existence of this disease in the uterus should be a sufficient indication for panhysterectomy. It is believed that we should never assume the uterus is free of the disease if it has been found in the chorion.

The disease is so fatal and the chances of extirpation by early operation so good that I believe greater benefit will arise from removal of the uterus without preliminary curettage and possibly removing a small percentage of non-cancerous uteri than from the curette and the danger incident to its use.

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AN UNUSUAL HÆMATOMA FOLLOWING LABOR

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HÆMATOMATA of the pelvis following labor are not very rare especially in primiparæ. It is quite reasonable to suppose that the trauma of labor may often cause small collections of blood which are later absorbed without symptoms and are unsuspected by the obstetrician. These may be situated in the labia, the vaginal wall, the rectovaginal septum and in the broad ligaments.

The records of the Lying In Hospital of New York City show about one case of hæmatoma to every thousand labors. Rarely there occurs a type of hæmatoma in which the hæmorrhage is so alarming that the patient's life is endangered; collapse occurs and operative interference is necessary to save the patient's life.

Williams in 1904 collected thirty-three cases from the literature and added one of his own which he treated by abdominal section. Harrar reports three cases of this rare variety occurring in the Lying In Hospital of the city of New York in 23,000 cases. The exact origin of the hæmorrhage is obscure but it is extraperitoneal and dissects up behind the pelvis or laterally in the broad ligaments. In one of the reported cases it seemed to come from the small capillaries at the base of the bladder or from the venous plexus in and about the bulbous vestibuli. It is not due to any lesion of the uterus. Another type of large hæmatoma is that due to incomplete rupture of the uterus. In such cases the mass is apt to be situated in the vaginal vault or in the broad ligaments and its source. In the case I have to report the exact origin of the bleeding was not determined with certainty; it may have been due to an incomplete rupture of the uterus or may belong to the class of large hæmatomata without uterine lesion as mentioned above.

On August 1917 I was called to see Mrs. S. age 22, who had been delivered of her second child seventeen days before.

The family history was negative as a girl she had enjoyed good health; she had been married

three years. Her first labor two years previous had been easy and normal. During her second pregnancy her health was good; the labor was slow and the child which was born living weighed 9 pounds. No instruments were used.

After waiting several hours the physician passed his hand into the uterus and removed the adherent placenta. There was no unusual bleeding at this time. When he saw her two days later she was rather pale, was flowing a little more than normal and complained of nausea. Her pulse was 90 and temperature 99.

He was not called again till the eighth day when she had a slight chill and he found her with a temperature of 101. At that time the uterus was irrigated with normal salt solution. During the eight days intervening between her first chill and the time I saw her the pulse and temperature rose slowly. On the fourteenth day the physician first noticed a large mass in the abdomen. He thinks it increased in size during the next three days.

When I saw her seventeen days after her confinement I was struck by her excessive paleness. She was the whitest woman I have ever seen. The pulse was 100 and the temperature 101. She complained of no pain in the abdomen, only a slight tenderness on pressure.

The mass occupied the entire right side of the abdomen, rising from the pelvis and disappearing under the ribs and extending to the left beyond the median line. The abdomen was about the size of a seven months pregnancy or possibly even larger although unevenly enlarged. The mass was smooth and rounded and quite firm. There was no tympany or vomiting or evidence of peritonitis. The patient had been somewhat constipated but the bowels moved readily from enemata or cathartics.

On examination the uterus was movable although it could not be well outlined; the cervix was slightly enlarged and not torn; there was thickening and resistance in the right fornix but no distinct bulging into the vagina. There was a little bloody vaginal discharge. Although it was evident that the patient had lost a great deal of blood, we did not feel at all positive that the mass in the abdomen was a hæmatoma and exploratory operation was decided on with reluctance owing to the apparently hopeless condition of the patient. The abdomen was opened by a four-inch incision through the right rectus muscle. The mass was then revealed as a dark red tumor retroperitoneal and of the size mentioned above. It was in contact with the liver above and seemed to blend with the uterus and broad ligament below. So far as I could determine there was no evidence of free blood having been in the peritoneal cavity. The appendix was observed to be normal. Before a satisfactory examination



Fig. 1 (4349) Marked polypoid growth approximately actual size



Fig. 2 (4349) Section of a polypus showing the normal mucous membrane increase in the glands and lymphocytic infiltration

branched. These glands are lined with columnar epithelium among which are a great many goblet cells. In certain areas retained secretion clinging to the surface of the cells may be seen. Blood vessels show some congestion and the whole thickness of the specimen shows a distinct infiltration of lymphocytes (Figs. 1 to 4).

Some observers have noticed a peculiar family tendency in these cases. Doering (1) states that Zahlman records an instance in which six brothers and sisters died of the disease.

Gastric polypi are similar in structure to those found in the intestine. They are usually found along the greater curvature near the pylorus. They may be adenoma, fibroma, myoma, or lipoma. Wade (2) describes a case of intussusception of the stomach and duodenum caused by the presence of a benign pedunculated fibroma. Gibson (3) cites a case of pedunculated polypus just inside the pylorus which caused intermittent obstruction—a ball valve action.

Intestinal polypi may be single or multiple; the latter being more common. Rectal polypi are not uncommon and according to Cripps (4) two common forms of polypi are to be found in the rectum: the fibrous type which is a pedunculated tumor and composed for the most part of fibrocellular tissues and the other the adenoid polyp which are extremely vascular and consist of gland tissue. These are usually single. Extremely rare conditions

are the dermoid and the cystic polyp. Doering (1) states that there is a greater tendency to malignant degeneration in the rectum and cites twenty-four cases of rectal polyposis in which carcinoma was present in fifteen.

Occasionally cases have been seen at the Mayo clinic which on proctoscopic examination showed several polypi high up in the rectum. They were cauterized with the high frequency current. Microscopically they were of the adenomatous type. Another class of cases which have shown rectal polypi have been those of intestinal infection. These were also treated with the high frequency. In a few instances small carcinomatous polypi high up in the rectum two to four in number have been the means of making a diagnosis of a malignant growth higher up than could be reached with the proctoscope. These diagnoses have been verified by abdominal exploration.

The growths often cause obstruction and intussusception; the latter in fact is not of infrequent occurrence when marked polyposis exists. Bratrud (5) reports a case of intestinal polyposis with three distinct intussusceptions. Watts (6) also records a very interesting case of intussusception caused by these tumors which he was forced to operate on several times. At the first operation he reduced the intussusception. A week later

THE KINETIC THEORY OF PERITONITIS¹

BY GEORGE W. CRILE, M.D., F.A.C.S., CLEVELAND, OHIO

INTRODUCTION

IT is my purpose in this paper to present a new explanation of the phenomena which accompany peritonitis and to outline the treatment suggested by this conception.

In the abdomen the leading symptoms of peritonitis are pain and tenderness, distention, muscular rigidity, intestinal paresis, vomiting. In addition to these local disturbances there are also the general symptoms of infection: accelerated pulse and respiration, raised blood pressure, fever, and rapid loss of strength and weight. I postulate that these are all adaptive phenomena, that is, that each individual phenomenon of peritonitis has been evolved for the good of the individual. In other words, the whole process is for the purpose of defense against injury, just as truly as physical fighting is for the purpose of defense against attack. In

like measure physical fighting and the body's defense against peritonitis are dependent on the transformation which is effected by the kinetic system. In peritonitis, as in the case of a physical attack, the defense may require so rapid and so extensive a transformation of the body's stores of energy that exhaustion or even death may follow. It follows therefore that in peritonitis, as in fighting or in any form of physical exertion, safety may lie in the control of the kinetic system.

ANALYSIS OF THE PHENOMENA OF PERITONITIS

As the abdomen has within it a germ-laden intestine, and as it was a part of the body that was frequently wounded in man's phylogenetic struggles with his environment, the peritoneum performs through natural selection acquired a remarkable power of self-defense against the consequent infections.

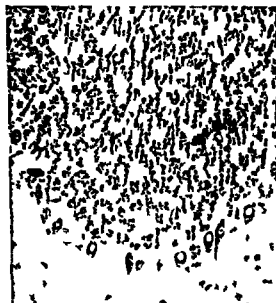


Fig. A. Section of cerebellum of rabbit, 10 minutes after injection of diphtheria toxin. The general hyperchromatism of the brain cells is the protection afforded by morphine.

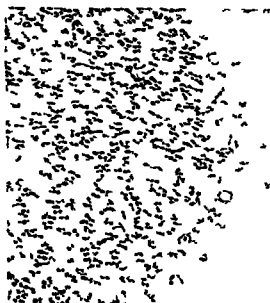


Fig. B. Section of cerebellum of rabbit, 10 minutes after injection of diphtheria toxin. Not the general hyperchromatism. Photomicrograph (10x) shows effect of diphtheria toxin on the brain cells and the protection afforded by morphine.

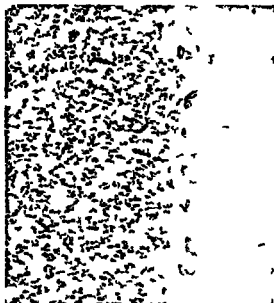


Fig. C. Section of rabbit ileum after injection of diphtheria toxin and morphia. The protective effect of morphia is illustrated by the presence of the peritoneal cells. Photomicrograph (3) shows the effect of diphtheria toxin on the peritoneal cells and the protection afforded by morphia.

As an infection is most readily spread and increased by movement immobilization is the prime requirement in overcoming an infection. Within the abdomen this immobilization is accomplished (a) by inhibition of the intestines (b) by distention of the intestines (c) by rigid and persistent contraction of the abdominal muscle and (d) by the exudation of a sticky glue like material. The infected point in the peritoneum may therefore be completely fixed (a) by paralysis (b) by distention (c) by rigidity of the abdominal wall and (d) by gluing.

On account of the intestinal inhibition digestion and absorption cease and anorexia and vomiting follow — self protective measures which have been evolved against the danger from poisonous broken-down food.

We see therefore that the paralytic distention of the intestines the muscular rigidity of the abdominal wall the anorexia and the vomiting which accompany peritonitis are natural adaptations for the purpose of localizing and overcoming the infection. As for

the pain and tenderness they are part of the protective mechanism and play their rôle by forcing the body to maintain a boardlike rigidity of the abdominal portion.

When the abdomen is rigid it can no longer play its important respiratory rôle and the respiratory movements are confined to the thorax in fact the lower thoracic movements also are inhibited since the movable ribs are fixed on the abdominal side. As the lungs are but partially filled the respiratory rate is increased to compensate for the diminished volume of the exchanged gases. The diminished respiratory movements of the lower chest induce vascular congestion vascular congestion induces pleurisy and pneumonia.

The loss of water by vomiting the diminished intake of water and the failure of water absorption cause a rapid shrinkage of the soft parts which is especially noted in the face while the increased blood supply to the intestines combined with the diminished intake of water causes a rapid diminution of the pulse.

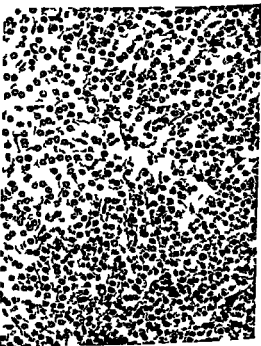


Fig. A. Section of ileum of rabbit normal. Photomicrograph (3) showing the effect of diphtheria toxin on the ileum and the protection afforded by morphia.

volume. The loss of water is followed also by a diminished volume of urine. At the same time metabolism is increased there is an increased concentration of solids which can not be eliminated by the kidney handicapped as it is by the diminished urinary output. The skin in turn therefore is forced to attempt by increased activity to compensate for the renal insufficiency.

We see therefore that the characteristic phenomena of peritonitis are as natural as the phenomena of walking running or fighting. The increased pulse and respiratory rate and the fever are characteristic not of peritonitis alone but of all infections. They are the result of the forced conversion of potential energy into kinetic energy as a defense. This defense also is an adaptation developed in the body by natural selection and is the means by which foreign proteins — infection products — are broken down.

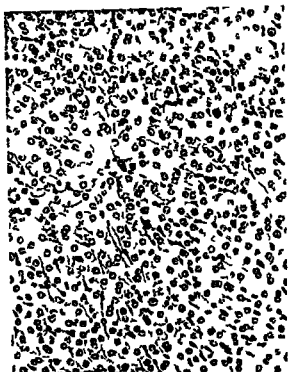


Fig 2-C. Section of liver of rabbit infected with diphtheria toxin and morphine. Note the irregular arrangement of the cells and the exodus oftoplasmic contents from the cells. The general disorganization of the cells. B. Photomicrograph (x3) showing the effect of diphtheria toxin on the liver and the protection afforded by morphine.

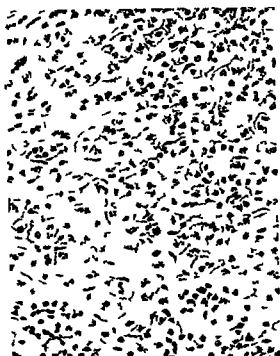


Fig 3-B. Section of liver of rabbit infected with diphtheria toxin. Note the poor arrangement of the cells and the loss of regular outlines. The acellular spaces and loss of cytoplasm. Photomicrograph (x3) showing the effect of diphtheria toxin on the liver and the protection afforded by morphine.

THE TREATMENT OF PERITONITIS

If the body wide disturbances caused by peritonitis are adaptations for defense then we must conclude that death, caused by an excessive discharge of the body's store of energy in maintaining the defense. Our problem therefore must be to discover some means by which the method of defense evolved by nature may be maintained while at the same time the energy of the body is conserved as far as possible.

The evidence upon which we base our postulate that the excessive transformation of potential into kinetic energy is the cause of death in peritonitis points the way to the method by which the energy may be conserved.

In experimental researches my associates — Drs J B Austin, H C Sloan, I W Hitchings and M L Menten and I have

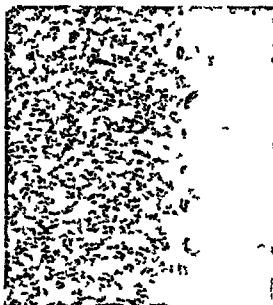


Fig. C. Section of cerebellum of rabbit infected with diphtheria toxin and morphia. The protective effect of morphia illustrated by the presence of hyperbromic cells. Photomicrograph ($\times 3$) showing effect of diphtheria toxin on the brain cells and the protection afforded by morphia.

the pain and tenderness they are part of the protective mechanism and play their rôle by forcing the body to maintain a boxlike rigidity of the abdominal portion.

When the abdomen is rigid it can no longer play its important respiratory rôle and the respiratory movements are confined to the thorax. In fact the lower thoracic movements also are inhibited since the movable ribs are fixed on the abdominal side. As the lungs are but partially filled the respiratory rate is increased to compensate for the diminished volume of the exchanged gases. The diminished respiratory movements of the lower chest induce vascular congestion. Vascular congestion induces pleurisy and pneumonia.

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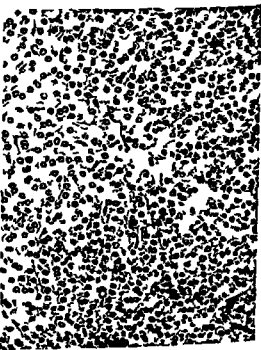


Fig. A. Section of liver of rabbit infected with diphtheria toxin. Photomicrograph ($\times 3$) showing the effect of diphtheria toxin on the liver and the protection afforded by morphia.

As an infection is most readily spread and increased by movement immobilization is the prime requirement in overcoming an infection. Within the abdomen this immobilization is accomplished (a) by inhibition of the intestines (b) by distention of the intestines (c) by rigid and persistent contraction of the abdominal muscles and (d) by the exudation of a sticky glue-like material. The infected point in the peritoneum may therefore be completely fixed (a) by paralysis (b) by distention (c) by rigidity of the abdominal wall and (d) by gluing.

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We see therefore that the paralytic distention of the intestines, the muscular rigidity of the abdominal walls, the anorexia and the vomiting which accompany peritonitis are natural adaptations for the purpose of localizing and overcoming the infection. As for

while the phagocytes overcome the infection. That deep opium narcotization is a very efficient treatment for peritonitis was well known to the older clinicians especially to Alonzo Clark and to Flint who gave opium until the respirations were far below normal as low even as ten or twelve per minute.

The appearance of these patients would seem to indicate that they are perilously near death in reality they are in a condition which closely resembles hibernation and which continues until the local immunizing forces overcome the infection.

In cases of appendicitis with spreading peritonitis the surgeon should never in the whole scheme of treatment lose sight of this prime need of protecting the kinetic system from exhaustion. The administration of morphine should therefore begin at once. Nitrous oxide the inhalation anesthetic of choice as ether by dissolving the lecithin in the phagocytes causes a weakening of the body's defense which may last from twenty to twenty-four hours—a break in the defense which may cost the life of the patient. The operation is performed under anoci association the local field being blocked as far as the zone of actual infection. Morphine is continued during and after operation as is required to conserve the patient's energies.

My associate Dr. Lower and I have employed this method in 391 cases of acute appendicitis with but two deaths.

We may define peritonitis as the adaptive phenomenon manifested by the kinetic mechanism in maintaining a defense against an

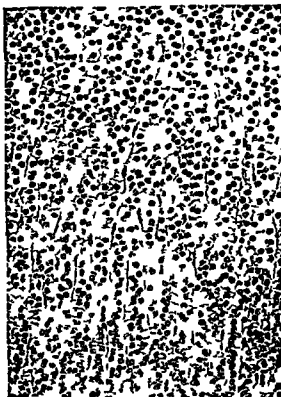


Fig. 3-C. Section of adrenal of rabbit. Section of diphtheria toxin and morphine. Note the presence and end distribution (cytoplasm) contrast with diphtheria. B. Photomicrograph (x3) showing effect of diphtheria toxin on the adrenal with protection afforded by morphine.

infection of the peritoneum and we find that the kinetic theory supplies a consistent explanation of the phenomena of peritonitis and also a true index to its successful treatment.

SARCOMA OF BOTH OVARIES IN A CHILD OF THREE YEARS

B. I. H. SMITH, M.D., and J. COLEMAN MOTLEY, M.D., AMERICAN MEDICAL ASSOCIATION

IN October 1912 we performed double ovariectomy for bilateral tumor of the ovaries upon a child of three years. This experience led to a search for recorded cases of tumors of the ovary in young children especially of solid tumors and closest attention has been directed towards report of bilateral tumors. The results of

this search with the report of our own case is the material of this paper.

Broad statements as to the frequency of occurrence of solid ovarian tumors in childhood and direct reference to recorded cases seem to vary widely. As instances leading to the supposition that carcinoma at least bilateral carcinoma is quite common in



Fig 1 Gross specimen
Note nodular potato
like appearance

Fig 2 Gross specimen
Note solid meaty
appearance

childhood one may cite the following statements. Bilateral carcinoma is very common (Klauhammer 1). Cancer of the ovary is not very rare in children and bilateral cancer is common (Dreyfus 2). And Ovarian carcinoma in children is reported in large numbers by Olshausen Gussenbauer and Kaltenbach etc (Berent 3). Yet Jochmann (4) in 1898 could collect only thirty solid tumors of all sorts during childhood. Hubert (5) in 1901 could find only one hundred seventy five including children as old as 17 years and Wiel (6) in 1904 asserts that carcinoma of the ovary is very rare in young children and that this is the fourth case reported for the removal of the growth. In explanation of the discrepancy it may be that one refers to all observed cases operated or not the other only to operated cases. Surely operated cases are not common for Spencer Well out of one thousand ovariectomies had only three in children. Schauta three out of three hundred ninety four and Olshausen had only sixteen in children out of 1716 ovariectomies. And these figures refer to ovariectomy for all conditions in childhood. In the material at the Budapest Stefania Children's Hospital during the four years preceding 1905 among the 71101 diseases during childhood ovarian tumors were found in only four (7).

There is striking uniformity on the other hand as to the relative frequency of malignancy among all reporters. While cystadenoma and embryoma are the most common carcinoma and sarcoma embrace 34 per cent (Winternitz and Finaly) or of Hubert's list 34.29 per cent and of Wiel's, 31.81 per cent whereas of 1239 ovariectomies of adults only 47 or 3.8 per cent were sarcomatous (Hubert). Because then the tumor is usually malignant Gross (8) says that the prognosis in ovarian tumor is serious they grow very rapidly and the younger the child the more rapid the growth. Carcinoma and soft round cell sarcomata give the poorest prognosis they are more commonly bilateral while the hard spindle-cell growth is usually unilateral and shows little tendency to metastasis. Fibrosarcoma gives the best chance but is infrequent in children (Berent).

With such figures in mind no one can dissent from the opinion that the therapy of ovarian tumors in childhood is always operative and should be instituted immediately after arriving at a definite diagnosis in benign tumors on account of the constant growth and marked symptoms. Without it one cannot tell whether malignant degeneration has occurred or not. In malignant tumor of course operation is imperative though operation during childhood does not give a very good prognosis as a whole (Klauhammer).

In connection with the prognosis of malignant disease after operation statistics are notably unreliable. It must be borne in mind that many cases are reported merely because there was recovery while it may be assumed that some cases with unfavorable issue are unrecorded. Furthermore many of the reporters mean by recovery merely immediate recovery though death may have occurred from metastasis later. We can only take the figures as we find them (Wiel).

Aldibert is quoted (1) as placing the mortality after operation in solid ovarian tumors at 59 per cent in cystic tumors as low as 11.2 per cent. Bland Sutton's mortality was 58.3 per cent (Page 9). Kelly speaking in general says that operation on children is attended by a mortality of more than one half (Wiel). Hubert could follow twenty four sarcoma cases after operation in eleven a successful result followed while in thirteen

Dreyfus may mean pelvic speaking for in the same connection he says. Cancer of the ovary is encountered once in every affection of the adnexa requiring laparotomy (in children)?—

death occurred directly or as the result of metastasis. Of Wiel's cases the mortality after ovariectomy for sarcoma is 42.9 per cent with the result unknown in 8.3 per cent more in children of 5 years and under.

In our search for recorded cases at the Surgeon General's Library our attention has been attracted to the work of Jochmann (4) who in 1898 recorded twenty cases of solid tumor (list of cases not available) of Hubert (5) who in 1901 recorded 175 of both cystic and solid tumor to the age of 17 years—

Benign Tumors	
Dermoids	39
Cystomas	9
Cyst	53
Hæmatomata	4
Malignant Tumors	
Carcinomata and cystocarcinomata	28
Lidotheliomata	4
Sarcomata and cystosarcomata	28
Total	75

—and of Wiel (6) who in 1904 and 1905 found 60 operated cases to the age of 10 years—

Dermoids	2
Teratomat	
Cysts	16
Papilloma	3
Carcinomata	3
Sarcomata	5
Total	60

These compilations are regarded as complete to their respective dates and within the limits of their respective titles. We might remark therefore that in introducing our own table only six were reported prior to Hubert's dissertation and none is in Wiel's list though there are several in our table reported prior to Wiel's paper omitted by him because of the limitation of his title. In none of these compilations is a bilateral case reported. We have here introduced into the paper a table of all of the cases of ovarian tumor in children some as old as 16 years which we have been able to find record of under the name of the reporter mentioning the age of the child the nature of the tumor the results of the operations and finally the original reference when it can be found.

In this list of forty seven cases one will note three cases in which the tumor was found at autopsy and one was a pathological specimen they are included in the list be-

cause we wished to make it as complete as possible.

Summarizing the table with reference to the nature of the tumor

Dermoids	3
Cysts	6
Cystoma	
Polycystic tumor	1
Cystic adenoma	1
Cystic embryoma	1
Solid tumors	2
Teratoma	1
Teratoma with carcinoma	1
Teratoma chorioepithelioma	
Hypernephroma	
Endothelioma lymphosarcoma	1
Carcinoma	8
Sarcoma	16
Total	47

Of these the following are bilateral the only bilateral cases we are able to find definitely recorded

- bilateral dermoid child 11½ years, (Legueu)
- bilateral carcinoma child 14 years (Kouznetsky)
- 1 bilateral teratoma child 14 years, (Kartuschanskaja)
- 1 bilateral sarcoma child of 13 years (Croome)
- 1 bilateral sarcoma foetus 17½ months, (Doran)
- 1 bilateral carcinoma involving the second from the first ovary child 12 years (Martland)

The mortality figures are hardly interesting as the result in so many is unknown. We tabulate the mortality at any rate

Total cases	47
Less autopsy and foetal case	4

Workable cases	43
Recovered	or 48.77 per cent
Died 10 or 3.6 per cent	
Unknown 12 or 27.9 per cent	2 or 5.7 per cent

Of the carcinomata and sarcomata

Total cases	25
Less autopsy and foetal cases	4

Workable cases	21
Recovered	7 or 33.83 per cent
Died 6 or 28.57 per cent	
Unknown 8 or 38.09 per cent	4 or 66.66 per cent

We add now our own case in abstract

Case. One of us (Dr S.) was called October 21 1912 by Dr James W. Cummings of Abingdon to a white girl age 3 years who had been complaining of recurrent attacks of abdominal pain of constipation and nausea and vomiting for a month with a mass in the abdomen discovered 3 days ago. The child was the next to the youngest of a family of eight children all living and in good health except two dead of pneumonia and summer complaint. This child had been well until a month ago when it became ailing with digestive symptoms taken to indicate worms or biliousness. Calomel, Santonin

SURGERY GYNECOLOGY AND OBSTETRICS

OVARIAN TUMORS IN CHILDREN

Reporter	Age	Tumor	Result	Reference
Budin	M	Solid tumor	Death	Bull Soc Anat de Paris, 18 22
Krausberg	2	Carcinoma	Recovery	Berl klin W Wochr 21 225
Donan	Fetus	Sarcoma (double)		Tr Path Soc London, 180
Croon	2	Sarcoma (double)	Recovery	Edin M J 303 February
Kruze		Myxosarcoma	Death	Dissertation V rburg 1894
Juchmans	4	Sarcoma	Autopsy	Dissertation F rburg-Baden 504
Rompré	3	Ovarian tumor	Recovery	Ann M M 21 10
H bert		Endothelioma	Recovery	Dissertation Götting, 1902
Leopold		Sarcoma	?	Quoted Berest, Dissertation Berlin 1902
Wag er	2	Sarcoma	Death	Quoted Berest, Dissertation Berlin 1902
Requet	1	Carcinoma	Autopsy	Quoted Berest, Dissertation Berlin 1902
Spencer W J	1	Carcinoma	?	Quoted Berest, Dissertation Berlin 1902
Kiebs		Carcinoma	Recovery	Quoted Berest, Dissertation Berlin 1902
Berest		Carcinoma	Death	Dissertation Berlin 1902
Legros	14	Dermoid (double)	?	Quoted Walker Dissertation Leipzig 1902
Marchand		Dermoid	Recovery	Quoted Walker Dissertation Leipzig 1902
Hedon		Cyst	?	Berl M J 1902 Nov, p 190
Coussere		Myxosarcoma	?	Thèse de doc. P r, 1902
Fick		Teratoma	Death	Berl klin W Wochr h p 58
Kossaksky		Carcinoma (double)	Recovery	Ann Oyonne Obst 20
Erdmann	3	Cyst	Recovery	J Am M Ass. 205 May
Michel	6	Carcinoma	Death	Zentralbl f Gynäk 1902
Winterstein and Finlay		Cystic embryoma	Recovery	J heb f Kinderh 189 202
Winterstein and Finlay	6	Simple cyst	?	J heb f Kinderh 189 202
Winterstein and Finlay	6 1/2	Cystic embryoma	Recovery	J heb f Kinderh 189 202
Winterstein and Finlay		Dermoid	Recovery	J heb f Kinderh 189 202
Karionchanskaja		Teratoma (double)	Recovery	Dissertation Zürich 1902
Spengel		Cystoma	Recovery	Deutsche Char 244 p 444
Asanaga		M lilarcular cyst	Recovery	Berl M J 18 263
Dreyfus (or Don h ser)	2	Adenosarcoma	Death	By Dreyfus Thèse de doc. P r 1907
Edin us	3	Sarcoma	Death	A Setz Phila 244 510
Romstein		Cyst	Recovery	J Am M Ass. 189
M rland		Teratoma w h carcinoma (double)	Death	Proc N Y Acad Sci 2 11
M Muller	16	Multilocular cyst	Recovery	B t M J p 8
Walther	5	Cy adenoma	Death	Dissertation, Le p r 21
Walther		Cystoma	Recovery	Dissertation Leipzig 19
Rosenthal		Multilocular carcinoma	Recovery	Deutsche med Wochenschr 24 24
Peromozoff	2	Sarcoma	?	By Rosenthal Deutsche med Wochenschr 24 24
Racy	2	Myxosarcoma	Recovery	Bull et m m de char de Par 1894 664
Racy	6	Polycystic tumor	Recovery	Bull et m m de char de Par 1894 664
Savornud	2	Follicular sarcoma	?	Bull et m m de char de Par 1894 630
Gaudier		M perinephroma ovarian	?	Bull et m m de char de Par 1894 630
Droz	14	Fibrosarcoma	?	Proc med Wochenschr 24 24
Michaampes		Cystic embryoma	Recovery	Dissertation Jena 19
Alloch		Sarcoma	?	Dissertation Jena 19
Kayser	10	M no endothelioma sarcoma	?	Dissertation Jena
Leung and Gursul		Sarcoma	Autopsy	Arch de Med d Ent 271 107

In each case we have given the name of the original reporter with the original reference even though the information is obtained through another citation.

related because of the fact that is bilateral tumor

*Cited by Martin and quoted by Huxton.

*Cited by Permit report

Cited by Walther 290

*Tumor involved one ovary & first operation, second attempt to remove failed at third operation 3 weeks after first, other ovary was also involved

also involved
Cited by Global 50

Elshammer states that Moed exhibited specimens removed from child of 5 years.
Elshammer, authority

child of 5 years.
Klebsauer authority

and oil were repeated several times with little improvement. Unsatisfactory results were obtained from all purgatives. The child was lost sight of for two weeks when again the symptoms returned met by the same treatment with like results. Appetite was now poor marked tendency to nausea bowels obstinately constipated distention unless the bowels moved thoroughly and from time to time colicky abdominal pains. Three days before abdominal pain became worse tenderness developed for the first time vomiting was more frequent. No fever had been noted at any time. Dr Cummings found a mass in both flanks and recalled that three and one half weeks ago he felt in the right iliac fossa an indefinite doughy mass which he feared might be of appendiceal origin but the absence of fever seemed to negative this and he lost sight of the mass when the symptoms remitted. The mother said that the tumor changed size and shape very much in a little while. Did not know that defecation influenced either but knew that it certainly relieved the pain. She also commented on the fact that one minute the child might play about the room as if nothing were wrong and in a few minutes would be doubled up with pain the abdomen was quite sensitive there was much nausea vomited several times when all symptoms would pass off again and the child would be comfortable. For three days no satisfactory defecation in spite of calomel oil and several enemata. This day she has vomited six or seven times. Upon inquiry the mother remembers that the child had been butted in the abdomen by a goat a few weeks before the first complaint no immediate ill effects.

Upon examination the child seemed healthy and well nourished mentally alert and apparently in no pain. Temperature normal pulse 103. Negative except for the abdominal findings. The abdomen was asymmetrical a mass in each iliac region. General distention upper portion tympanitic but otherwise negative. No tenderness anywhere. In the right flank there was a palpable mass extending into the abdomen downward and inward parallel with Poupert's ligament to the symphysis where it seemed interrupted in the middle line and then continued, or else another mass could be felt in the same region of the left abdomen. The masses were solid yet doughy not tender irregular sausage shaped the two moved independently but no motion imparted to one could be transmitted to the other. Upon rectal examination the right sided mass was felt as it were end on the finger almost passing around its lower pole. The left sided one could also be felt apparently not connected with the other. Other wise nothing was learned.

White blood cells 19,000 per cmm differential showing polymorph leucocytes 63 per cent small mononuclears 9 per cent large and transitional mononuclears 7 per cent eosinophiles one per cent. The urinary report is missing but it was essentially negative.

The diagnosis of ovarian tumor was suggested at consultation and largely accepted but because of the fact that such a condition in so young a child was unheard of by any of us Dr S was persuaded out of his conclusion and accepted the diagnosis of chronic partial obstruction of the bowel from an unknown cause. The patient was removed to the Abington Hospital and immediately prepared for operation proposed to relieve the obstruction.

Operation October 22 1912 Dr Cosby anasthetist ether three ounces Dr Motley operating assisted by Dr Smith.

Straight incision to the right of the median line. A large sausage shaped mass in the right flank the identity of which was confusing because of dense adhesions of omentum and of coils of bowel looped around the omental adhesions producing obstruction and also because of a long tube like structure adherent to the upper pole of the tumor. Right and left kidneys were identified the adherent structures separated when the broad ligaments and the infantile uterus could be recognized then the tumor identified as ovarian or parovarian. Removed after ligation of pedicle. The left sided tumor was approached in the same manner. But there were no adhesions on this side and the long tube like structure was not present to complicate matters. Removed in the same way. Abdomen closed by through and through sutures.

Normal post-operative course until interrupted by a pneumonic consolidation of the right base on the sixth post-operative day resolving on the third day. Bowels moved on third day by enema and each day thereafter urine in good amount after second day. Discharged on the twenty third day normal except for infrequent nausea.

The tumor was submitted for pathological identification to Dr B C Willis pathologist Richmond Va. By him they were shown to Dr Louis B Wilson of the Mayo Clinic. Drs Willis and Wilson report that the tumors were embryomata that recurrence would take place and the recurrent tumor would be of the nature of sarcoma.

On March 15 1913 patient was readmitted to the Abington Hospital her mother having discovered abdominal masses three days before.

Since her former discharge the patient has been well until three nights ago the mother on picking the child up from the floor felt a mass about the region of the navel. That night following enema acute abdominal pain requiring paregoric. When examined next day a large central mass was found apparently a tumor of the omentum centering about the umbilicus with several other tumors scattered about over the abdomen as far around as the flanks. Urine negative. Blood picture about as before. A diagnosis of abdominal sarcomatosis was beyond question Dr Wilson's prediction having been all too well fulfilled she was referred to numerous physicians by her father all confirming the diagnosis and refusing to advise operation with death ensuing in May 1913. No autopsy was permitted.

Dr Willis has been so kind as to furnish us with a pathological description of these tumors and with photographs and microphotographs of the specimens and has added embryological data which enable us to get our bearings. He reports that macroscopically the tumors were covered by peritoneum and measured the right 13×17 cm the left 7×15 cm. They felt solid to the touch with smooth protuberances at irregular intervals giving them much the appearance of Irish potatoes. On section they were solid throughout and of a distinctly meaty appearance with small blood vessels scattered throughout (see photographs of the gross specimen). Microscopically the tumors were very similar in structure. In areas there were solid masses of embryonal cells with practically no intercellular stroma in others there were remains of tubules under great pressure. The individual cells were of very immature type no outer cell wall could be distinguished and were surrounded by very little protoplasm.

So then these tumors belong to the broad class of embryoma a mixed tumor derived from all three layers epiblast mesoblast and hypoblast. But the malignant sarcomatous stamp is fixed upon them by the preponderance of the mesoblastic tissue. It was this feature which prompted Dr Wilson to predict a sarcomatous recurrence. Further more it might be interesting to recall the close kin between embryoma and teratoma and in this relation to note that Martland's case included in our paper one of the few bilateral tumors found was finally decided by a committee to which it was referred for study to be probably a three layer embryoma or teratoma of the ovary showing carcinomatous changes (12).

The parovarium the epoophoron or the organ of Rosenmüller as it is variously called consists of a group of tubular structures

lying transversely within the broad ligament between the ovary and oviduct. It represents the partially obliterated remains of the Wolffian body and duct (10) the latter being practically synonymous with the mesonephros. The mesonephros is in turn derived from the primitive segment stalks which project into the primitive body cavity as the urogenital ridge and from these stalks material is derived for the development of all three excretory organs including the mesonephros. The greater portion of the mesonephros and its duct (i.e. the Wolffian body and its duct) atrophies but the upper portion of the duct persists in the female as the parovarium (11) an important point in the present case because it is from a prenatal rest composed of this tissue that we believe these malignant tumors were developed. Strictly speaking then the tumors in our case were parovarian embryomata with sarcomatous (mesoblastic) elements predominating.

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THE EXCESSIVE MORTALITY OF HIGH INTESTINAL OBSTRUCTION¹

WITH REPORT OF CASES

BY W. W. GRANT, M.D., DENVER, COLORADO

THLRL is probably no field of surgical research at the present time that is of more interest and importance than the cause of the excessive mortality in high obstructions of the small intestine. Until the last year or two not even a plausible explanation has been offered. While the death rate due to complete obstruction in any part of the small intestines is high yet it has long been recognized that the rate is higher when the seat of obstruction is in the upper jejunal and duodenal tract. While due consideration has been given to the prior investigations of Murphy and Vincent² of Roger and a few others it is perhaps only necessary on this occasion to refer to the more recent investigations of Whipple, Stone and Burnheim of Baltimore³ and of Hartwell, Hoguet and Beekman of New York and the recent work and articles by Draper.

These investigations have given the chief important bibliography and data to the present time. The experiments have been made mostly in dog the detail of which it is needless to attempt to give on this occasion. The conclusion of Whipple, Stone and Burnheim are that death is due primarily and chiefly to poison secreted or produced by the duodenal mucus and stagnant contents above the seat of obstruction and that the loss of water from the tissues into the paralyzed distended intestine and stomach is a secondary phenomenon.

Hartwell, Hoguet and Beekman conclude that death is due first to the excessive water loss which regurgitates into the stomach and is vomited and secondly to a toxin which is the result of bacterial invasion of the paralytic and traumatized intestinal wall. Both schools New York and Baltimore agree that general bacteræmia though plausible is not tenable. These investigations

seem conclusive in many respects but it probably cannot yet be affirmed that the cause of death is fully and finally determined. However the future seems bright and more promising of good results which is the aim of all investigations. The supreme test in every instance is the final application of all animal experimentation and laboratory results at the bedside. In the past year I have operated upon and treated two typical cases of mechanical obstruction. The histories are interesting and may be regarded as instructive even in the absence of satisfactory results.

H. F. R. male age 51 grocery merchant in Iowa. Came to Colorado seven years ago for asthma, bought ranch and engaged in cattle business recovered early from asthma and was in good health until last fatal illness which commenced August 15, 1913 at which time he took an active cathartic. The effect was severe griping pains in abdomen with satisfactory result. The next day on account of pain he sent for a physician who proceeded to give cathartics which were vomited, rectal enemas which were of no avail and hypodermic injections of morphine to relieve pain. No other measures were used and the vomiting continued finally becoming fecal. On August 22 he was taken to St. Luke's Hospital in my charge. On admission his temperature was 97.4 pulse 92 he was restless and only with great effort did he speak above a whisper. With a full week of vomiting and no nourishment his exhaustion was not surprising and yet his pulse was full in volume and strength. There was not much tympanites or pain on pressure but there was a globular tumor around the umbilicus. The abdomen was flat and dull below. Obstruction was manifest and I operated immediately. Subdermal salt solution was given on the operating table and ether for anesthesia. The operation revealed the upper small intestines lying in parallel rows and enormously distended and the lower intestines collapsed. I observed a 10 inch bulbus of the jejunum with localized gangrene at the seat of obstruction. No general peritonitis and adhesions were limited to the loop at the point of obstruction. There was no perforation and no free fluid in the peritoneal cavity. The intestines were easily withdrawn and the partially gangrenous loop incised but not divided and a rubber tube put in each end and fixed by purse

¹ Boston M. & J. or A. and other papers and J. Am. M. Ass. September 1

string suture. By gentle manipulation the intestines were evacuated and then irrigated through the artificial opening with warm salt solution every care of course being used throughout the operation to prevent soiling of the peritoneal cavity. The intestine was stitched to the peritoneal incision and the gut protected by a wire screen over moist sterile gauze. Stomach lavage was used before the patient left the operating table. Appendix, gall bladder and stomach were examined and presented no evidence of perforation or laceration. Vomiting ceased immediately and his general condition was very good. August 23 8:00 a.m. second day temperature 98.5° pulse 94 respiration 20 August 24 same August 25 8:00 a.m. 98.5° 4:00 p.m. 101° pulse 116 August 26 same—morning and evening August 27 8:00 a.m. temperature 100.5° pulse 126 August 28 temperature 99 to 100.5° pulse 120 to 130 respiration 14 August 29 temperature 101° pulse 120 to 130 intermittent and weak respiration 18 to 26 August 30 temperature and pulse fluctuated in same way. Early on the morning of August 31 the patient died as one in profound exhaustion from starvation and yet from the very day of operation on the 22d he was given and retained a large quantity of food by stomach and rectum. He was given salt solution daily for hours per rectum and at intervals peptonids by rectum as well as by the artificial opening after irrigation of the intestinal loops. At the end of the second day there was free and frequent fecal discharge per the enterostomy wound requiring frequent change of dressing. He seemed to improve for three or four days and then relapsed into the same restless exhausted state sleeping but little yet free from pain and with no complaint except weakness, no delirium and no mental confusion but apathetic. No peritonitis developed the abdomen remained flat and with no ordinary signs of sepsis. It is surprising that with complete obstruction he lived so long without relief and without nourishment.

The second case was a fine intelligent boy 10 years living with his parents on a farm near Stratton, Colorado. On September 1914 while riding a bicycle alone in the country his machine tumbled and he was thrown on his left side bruising but not cutting the left epigastrium. He probably fell on the handle bar of his bicycle. He reported suffering severe pain but after a little while started home pushing not riding his machine two miles. On the second day he was visited by Dr. Berchly of Stratton who recognized the surgical nature of his condition and brought him to St. Luke's Hospital, Denver with me to be prepared to receive him. There had been no bowel movement, no escape of gas and twenty-four hours after injury, rather frequent vomiting. Arrived at hospital September 5 with temperature 102° pulse 116. The abdomen was considerably distended and painful on pressure. The stomach greatly distended and the patient vomited a great deal of

liquid bile stained material. I operated immediately making the incision to the outer side of the left rectus and extending the incision as in the preceding case above the level of the umbilicus. The moment the peritoneum was incised a large quantity of dark liquid blood escaped from the peritoneal cavity. Examination revealed a link of the jejunum. There were no adhesions of consequence and the obstruction was readily corrected but deep in the belly in the upper part of the jejunum I discovered an abraded spot at least an inch long in the mesentery with hemorrhage beneath the adjoining peritoneal coat of the intestine for a distance of two or three inches. I closed the rent in the mesentery with catgut. There was undoubtedly a slow hemorrhage from this spot with considerable effusion of serum. There was no other lesion in the abdomen. There was no gangrene and the color of intestines below the obstruction rapidly improved under hot cloths and salt solution. To stop the regurgitation into the stomach and to drain the upper loop of intestine an immediate enterostomy was performed and the intestines irrigated with warm salt solution. For two days vomiting was frequent necessitating frequent stomach lavage. It ceased at this stage and he took nourishment freely by stomach with slow salt solution by rectum with hypodermoclysis also. During the first two days he was, at times, quite delirious. The second day September 6 the highest temperature was 101.5° evening 99.5° morning pulse 110 September 7 8 and 9 temperature and pulse fluctuated in the same way. There was no delirium and the patient seemed better although rapid emaciation was manifest in spite of the exhibition and retention of a large quantity of food by stomach, rectum and small intestine through drainage tube. On September 10 and 11 the morning temperature was 100.5° the evening 99° and 98.5° reversing the usual order. September 12 6:00 a.m. temperature 98.5° evening 99.5° pulse 116. The patient was weaker and again delirious by spells. September 13 temperature the same pulse 130 respiration 20—never much accelerated. From this time on exhaustion and emaciation were rapid with same moderate temperature but fast pulse until his death on September 19 just two weeks from date of operation and twenty days from date of injury. The fecal discharge around the intestinal tube soiled the wound greatly inflamed the skin over the abdomen and prevented union of the wound around the tube. This condition was doubtless due to the pancreatic secretions. This process was manifested on the fifth day after operation and as vomiting had ceased, and he was retaining food by both stomach and rectum I closed the intestinal stoma under local anesthesia and applied sterile vaseline to skin of abdomen. He progressed very well for a day. There was no fecal discharge by rectum even with enemata. Vomiting recurred and I found it necessary to do a second enterostomy which was performed at the upper angle of the wound under

local anesthesia and above the previous intestinal opening. A large catheter was used for drainage and the intestines irrigated through it also. Vomiting ceased almost entirely. Nourishment was retained but in spite of every care and attention the little patient went on from bad to worse until the end September 19. There was no general peritonitis, no distention of consequence and no pain except from the irritation to the outer surface due to pancreatic juices chiefly. No general sepsis existed.

In low obstruction the toxin it is claimed is not so virulent. In the experiments on dogs death occurred usually in three or four days from complete obstruction. The treatment so far is in the main unsatisfactory because unsuccessful. In the condition of complete paralysis existing in these cases after three days of complete obstruction enterostomy seems a necessity even with frequent stomach lavage. I used eserine and pituitrin to stimulate intestinal motility but with unsatisfactory results. Vaccines made from the duodenal and jejunal mucosa of healthy animals have been suggested by Oppinger and Guttman for intestinal toxemias on the theory of internal secretions of the intestines. Draper (Maur) found from experiments that dogs fed with such substances lived longer than the uncontrols. Hartwell and Hoguet admit that while the drainage

from the tissues can be replaced by salt solution it is not sufficient to prevent death. The solution was abundantly supplied in both my cases and the kidneys acted well in both. Whether the tissue drainage into the distended intestine and stomach is primary and the toxin a secondary evolution or vice versa makes little or no difference with the treatment. We know that the former can be successfully met but the toxin the production and nature of which is not yet understood destroys the patient very much as would be expected in a steady process of exhaustion from starvation.

Whether enterostomy should be performed in very recent cases brought promptly to operation for mechanical ileus with no serious intestinal lesion may be a debatable question. But after twenty four hours with intestines and blood vessels distended and paralyzed and vomiting frequent there can be no doubt that enterostomy gives more prompt relief to symptoms and at least prolongs life. Until some measure of relief is found for the toxin the result of the obstruction the mortality will continue high. It is to be hoped that by reporting such cases we may promote interest and inquiry in the solution of a grave and important class of cases.

GIANT-CELL TUMOR OF BONE

By I. GREGORY CONNELL, M.D. Oshkosh, Wisconsin

A STUDY of the giant cell sarcomata of bone leads one directly into confusion, misunderstanding and the use of words which apparently have different meanings to different people. The multiplicity of terms such as medullary giant cell sarcoma, myelogenous giant-cell sarcoma, myeloma, medullary giant cell tumor, chronic (non suppurative) hemorrhagic osteomyelitis that have been used to describe such lesions shows the indefiniteness of any one term. The distinction between these various tumors may be apparent theoretically, but clinically and microscopically it is not always present.

Adams (1) and Bland Sutton (2) take these tumors away from the sarcomata and class them under a separate heading, the myelomata which are described as tumors composed of tissue identical with that of normal red marrow of young bone. Bloodgood (3) realizing the disadvantage of the use of the term sarcoma utilizes tumor as a substitute. Mallory (4) considers the giant cells merely an incident and would not use the term giant cell sarcoma. Barrie (5) claims that this class of tumor formation is merely a type of inflammation and suggests the term chronic hemorrhagic osteomyelitis.

That these tumors are usually benign or comparatively non-malignant was probably first recognized by Koenig, Bergmann, Brannan and Mikulicz in 1895 were among the first to perform local or conservative operations for such conditions and cases treated upon this principle have frequently been reported since that time.

The literature upon this subject may be found by referring to the writings of Blount (6) who in 1900 was the first in America to treat such a case conservatively and who in a series of excellent monographs and annually in the December number of *Practitioner Medicine* has repeatedly and thoroughly discussed local portions instead of amputation.

The relative benignancy of giant-cell tumor of bone would seem to have been conclusively demonstrated yet a malignant type of this tumor does occur as is shown by the report of Coley (7) of the late J. C. Stewart (8) and other. Stewart claims that even in one fatal case it is enough to disprove all theories of benignancy and he asks the very pertinent question: "What is a giant cell sarcoma?" The usual view is that it is a tumor which contains a large number of giant cells, but many giant cells seem undifferentiated and as they are enough to give a distinctive picture. So has an imperfect definition of course unsatisfactory and gives rise to confusion. It was claimed by Stewart that the matrix in which the giant cells are the essential element in this tumor and as response to the clinical features, other arrive at the same conclusion. Jones and Whitman (9) say that benignancy or malignancy must be decided for each case independently and the diagnosis is reached on its own entirely separate from the presence or absence of endothelial giant cells.

Another explanation for the differing opinions was presented by Millery (10) in 1911 in which he emphasizes the fact that there are two types of giant cell tumor: giant cell and the other a foreign body giant cell (Fig. 1 see also Figs. 3 and 4).

The former are usually large clear fluid-like cells with distinct outline but staining faintly, within which there are multiple nuclei or a large multilobulated nucleus with

mitotic figures which are large and are situated in the center of the cell. These are usually in important features of the microscopic picture although at times they may be numerous and conspicuous. They are the tumor cells result from multiple mitosis and signify rapid growth.

The second type are as a rule small with their cytoplasm faintly abundant, sharply defined and staining deeply with acid dyes. The nucleus are smaller and more numerous without mitoses and are often in clusters near the periphery of the cell. They resemble the osteoclasts of the bone marrow and are not tumor cells but are merely a reaction to the presence of foreign bodies and are due to the fusion of endothelial leucocytes. This form of tumor has been well known by Whitman (11). They may occur in any part of the body in tuberculosis or other granulomatous myoma of the uterus cancer in simple reparative or regenerative processes. They differ in respect from the osteoclasts that secure connection with bone and are normal and pathological conditions. Foreign body giant cells in a tumor involving bone usually only only cross in and disintegration of bone. They may be present in either rapidly or slowly growing tumors and do not signify rapid growth or malignancy. Both types may occur in the same specimen.

Mallory includes that bone tumors should be classified according to their type cell without reference to the presence or absence of giant cells and that their malignancy should be determined by the extent of invasion of other tissue their rapidity of growth and by the number of mitoses they present. According to Whitman (12) who does not agree with Mallory regarding these giant cell von Hansemann recognized three distinct forms of giant cells.

1. Foreign body giant cell of endothelial and leucocyte origin.

2. Lymphomatous giant cell tumor-cell proper but irregular mitoses and lack of cell division.

3. Myeloblastic. These are present normally in the red marrow of bone as osteoclasts and are the characteristic constituent of the myeloma.



Fig 2 Shows a foreign body giant cell between two foreign body cells From Mallory

The last differs from the first in that the nuclei are distributed evenly through the cell body and by an absence of central degeneration of the body and differs from the second by the nuclei being well formed and of uniform size

As long ago as 1897 McCosh (13) stated that in the future this group of bone-tumors would have to be subdivided

Trotter (14) in 1907 called attention to the necessity of a microscopic differentiation between the giant cells of bone-tumors M J Stewart of Leeds England (15) urged the necessity of differentiating between the true myeloid sarcoma and the malignant giant cell sarcoma and suggested that the histological diagnosis should be based upon the morphological characteristics of the giant cells especially as regards their nuclei claiming that in myeloid sarcoma they were numerous uniform small and without mitosis while in the malignant type they were few irregular often very large and mitotic figures were frequent

The unsettled condition regarding this pathological condition is again emphasized by the case in which Coley (16) reports an ossifying myositis which subsequently became malignant was diagnosed as giant-cell sarcoma by Professor Lwing and in which amputation was followed by metastasis and death Bloodgood (17) discusses this case and in speaking of the photomicrograph of the tissue says it does not look to me like a giant cell sarcoma but a very malignant mixed cell sarcoma containing giant cells Such circumstances would lead one to concur with Hertzler (18) when he says it must be recognized that there are no positive micro-



Fig 2 A (lower right marked Fig 1) from the tumor the leg B (upper right hand marked Fig 8) from the secondary growth at shoulder C (upper left hand marked Fig 7) from the tumor removed at amputation From Cathcart

scopic signs of sarcoma it becomes necessary to resort to other evidence than that of the microscope such as the history and macroscopic appearance of the growth

Bloodgood (19) says Every now and then

I have been informed of a case of giant cell sarcoma in which the patient died of metastasis Some of these tumors I have been able to investigate and have found that the tumors were not giant cell but the most malignant sarcoma of the cellular type containing some giant cells and that when the metastatic tumors have been examined there were no giant cells

It is therefore interesting to refer to a case in Cathcart's work on *Innocent and Malignant Tumors* (20) under the heading of malignant myeloid tumors Case 11 is summarized as follows Fibroplastic tumor of the humerus containing myeloid cell amputation at the shoulder joint recurrence of the disease death three months after operation secondary tumor in the lung The details of this case are given at length but I shall quote only from that portion of the report that describes the tumor in the lung He says that the myeloid cell are not so numerous or as large as those in the larger tumor Figure 2 is taken from Cathcart's

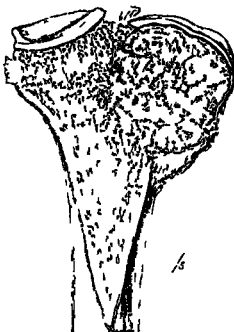


Fig 5 Myeloma of head of tibia From S Hottel

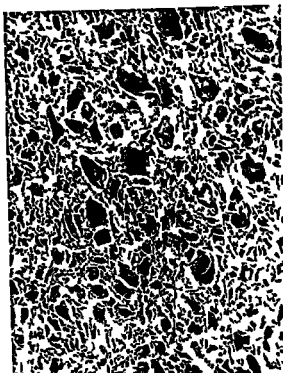


Fig 6 Case showing tumor giant cells Compare with Fig 5 (photomicrograph by Professor C H Bunting of the University of Wisconsin)

would have seemed *a priori* to have thrown considerable doubt upon Mr Grey's statement.

It is remarkable however that these myeloid cells should have been found in so many of the cases of amputation of limbs for supposed malignant disease in which the operation is known to have been successful but the question now arises whether they indicate anything more than that ossific changes are occurring in a tumor in which case they will be found indifferently in malignant and in innocent growths. Subsequent experience may enable us to determine the exact import of myeloid cells but at present it seems to me premature to elevate a characteristic which may after all be only accidental into the test of a radical difference in the nature of a tumor.

Clinically these tumors are usually located at the ends of long bones most frequently at the upper end of the tibia. According to Bland-Sutton they occur in this bone five times more frequently than in any other bone and five times more frequently at its upper than in its lower extremity. They are more common in young people and the same authority says that they are rare after 25 years though Bloodgood reports a case at 66 years.

The onset is usually sudden after a more or less severe traumatism. Tenderness is con-

stant but pain as a rule is not marked until there is a definite swelling. The course of the process is usually slow and of long duration. There may be crackling on palpation the so-called pinging bone. There is no redness or dilated blood vessels over the swelling.

The X-ray picture is not characteristic and the earlier the case the more difficult is the differentiation between bone cyst, osteitis fibrosa cystica and even metastasis of carcinoma or hypernephroma. In giant celled sarcoma the expansion is more abrupt and circumscribed and the distention greater than in bone cyst or osteitis fibrosa in which there is not so much expansion the growth less localized and more extensive longitudinally. In the benign growths even with marked expansion there is a preservation of bone shell while in the malignant medullary sarcoma the growth extends directly through the bone without causing any marked

preliminary dissection. The X ray is only an aid to diagnosis and should not be depended upon by itself in making a diagnosis.

On section the tumor is usually confined within the peritoneum the overlying bone may be very thin the growth is definitely circumscribed not infiltrating and is easily removed from the bone shell. The tumor proper is distinctly vascular resembles young granulation tissue in which may be found whitish bodies varying in size from a pea to a grape seed areas of osteitic fibrosis. The tissue in gross has been likened to red currant jelly, fresh cut liver, schmierläse and red bar de-luc. In consistency it is friable soft and cozes may be gelatinous and might resemble section of brain tissue at recent autopsy. The microscopic picture varies greatly giant cell of the osteoclast type predominating. Without these the histologic picture suggests granulation tissue. There are many endothelial lined blood spaces separated by connective tissue stroma filled with spindle and round cell.

As has been said above the diagnosis of giant-cell sarcoma is to a certain extent a matter of personal equation of the pathologist as men of recognized ability may differ in the interpretation of such tissue.

CASE 1. Mrs. C. Scholger. In 1907 this patient was referred to the late W. O. Hart by Dr. H. W. Abraham of Appleton because of swelling of the upper jaw. The histologic picture was typical of tumor of the superior maxilla the swelling was about the size of a walnut with protrusion of the eyeball and irritation of the nose with egg shell cracking on inspiration. There was no evidence of disease of the mucous membrane of the mouth or of the alveolar process there was no redness or edema of the skin. There was no pain or tenderness her only complaint was sense of fullness and the unsightliness of the deformity.

Under general anesthesia the mucous membrane above the alveolar margin was excised and the antrum was opened with a curette and a small amount of what appeared to be granulation tissue was removed for microscopic examination. A piece of gauze was placed in the wound. Healed rapidly. The microscopic examination led to a diagnosis of giant-cell sarcoma (the giant cells being exclusively of the foreign body type). The superior maxilla was advised (Fig. 3).

Operation was refused and the patient has received no medical attention. The swelling gradually subsided and she has enjoyed good health ever since. A recent report from Dr. Abraham says that the swelling has practically disappeared and that the patient is apparently in the best of health.

It is well known of course that giant cell epulis is a most benign tumor and that recovery is to be expected after local or conservative treatment. However this tumor was not an epulis but a sarcoma of the antrum of the maxilla and the removal of a minute fragment for diagnosis would hardly be credited as even a local or conservative line of treatment. The case is of interest and value in emphasizing the reserve with which one should credit an occasional so-called cure following some more or less unusual line of treatment. The fact that spontaneous cure or rather spontaneous subsidence of probable malignant growth must be reckoned with is hereby emphasized.

That all cases of giant cell sarcoma do not terminate as the above is well shown by Case 2.

CASE 2. Mrs. M. O. D. Russian married housewife has lived in America 10 months was referred by Dr. W. J. Schmidt of Mayville. Previous and personal histories negative family history unknown. In October 1911 patient first noticed a swelling the size of a hazel nut on the upper and inner aspect of the right tibia. There was complaint of swelling redness and tenderness but no pain nor pain. Treatment consisted of counter irritation antiseptic medicated and later massage. The swelling increased and the pain became intense and constant so that in February 1912 he could no longer walk because of pain. After cast was then applied to the knee but with no improvement.

In May 1912 the patient entered the hospital; the amputation. The cast had been removed and the patient complained bitterly when the limb was moved. Examination revealed a thin emaciated young woman in great apprehension and crying out with pain on moving the limb or touching the swelling which was about the size of a English walnut and raised about 1 1/2 inch from the surrounding surface at its highest point. It was located at the insertion of the tibia into the right tibia head, was definitely localized the skin over the swelling was freely movable with no redness edema or distended.

There was no egg shell cracking or pain in the bone. The knee joint was not swollen and appeared normal. Motion was not possible and passive motion caused severe pain. Because of the exquisite tenderness the swelling was aspirated but with

I am unable to give detailed history of the case but here use of rather unusual procedure of the patient of tumor has been tried other than usual procedure of the same being valuable I have consulted with the staff of the hospital.



Fig 7 Case 1 showing volume of joint and femur

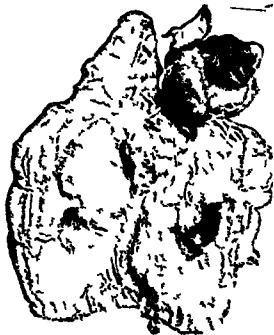


Fig 8 Case 2 longitudinal section of femur after amputation. Granuloma removed (second operation)

negative results temperature was normal there was no leucocytosis urine was negative with Bence-Jones bodies absent

X-ray picture by Dr C H Sims showed a localized lobulated tumor in the head of the tibia (Fig 4) Because of the marked similarity I am reproducing a picture of a similar tumor from Bland Sutton (Fig 5)

On May 28 1914 under ether an elastic constrictor was applied and a longitudinal incision was made over the swelling Division of the periosteum exposed the tumor which was distinctly localized and was composed of lobules of whitish gray cheesy material with bony trabeculae extending from the periphery toward the center

This mass was easily removed with curette and was about the size of a golf ball There was no distinct membrane lining the cavity which extended upward to the articular surface of the joint posteriorly to the periosteum and downward to the normal marrow of the medullary canal It was separated from the opposite side of the head of the bone by a distinct wall The wall of this cavity were curetted and cauterized with carbolic acid and alcohol

Frozen section by Dr Emily Oberlin revealed a typical giant-cell sarcoma the giant cells entirely predominating the histological picture the true tumor giant cell and foreign body giant cells both being present (Fig 6) The remaining cavity in the head of the bone was filled with subcutaneous fatty tissue derived from the patient the wound

closed without drainage and a plaster cast applied to the entire limb the cast was cut at once

Convalescence was noteworthy because of the constant and painful complaint of pain in the limb There was primary union and the stitches were removed and the cast changed on the seventh day On the twelfth day the fat escaped as an oily discharge from a minute opening at the upper angle of the wound There were no local or general manifestations of infection of the wound This was not followed by any relief from the pain which was constantly complained of

I anticipated that after the discharge of fat the wound would close and I went on my summer vacation and did not see the patient again until September 11 1914 During the interval there had been an outgrowth of granulation tissue from the wound which continually increased in size and was soon followed by swelling of the knee joint on July 9th an incision was made into the knee joint from which granulation tissue presented which failed to close as the granulating mass continually increased in size

The patient was readmitted on September 11 1914 with a granulating mass at the site of the previous incision and involving the knee joint This granuloma was about the size of an orange with a disintegrating crater in the center from which there came a very offensive discharge The tissue seemed extremely sensitive and very vascular There was no palpable enlargement of the iliac glands, and

cachexia was absent. The patient had become a morphine habitué and amputation was absolutely refused.

Wassermann by Dr Oberlin negative. X-ray examination at this time showed destruction of head of the tibia with invasion of the femur (Fig 7). On September 17, 1914, under ether this granuloma was excised (Fig 8 A).

The entire head of the tibia was involved and the resultant cavity was cauterized with the actual cautery and loosely packed with gauze and a trough splint applied.

Sections of tissue removed at this time showed some areas quite similar to that removed at the primary operation while other areas showed mixed cell sarcoma with fewer giant cells and small round cell infiltration. There was no amelioration of the symptoms following the cauterization and on October 10, 1914, the cauterization was repeated under ether and it was then noted that the growth had extended into the popliteal space. This second cauterization was followed by no change in the course of the disease. In spite of the suppurating mass and the constant pain there was an absence of the usual so called cachexia and no regional infection. Permission to amputate was finally given and on October 19, 1914, an apertostomal amputation at the junction of the upper and middle thirds of the femur was performed. Figure 8 shows a longitudinal section of the tumor mass. Sections of this femur showed the same giant cell formation. Amputation was followed by instantaneous cessation of pain, primary union, most rapid convalescence and satisfactory immediate result.

CONCLUSIONS

1. A diagnosis of giant cell sarcoma is not sufficient.

2. An attempt should be made to make a diagnosis regardless of the presence or absence of giant cells.

3. The giant cells should be differentiated into either foreign body or tumor giant cells.

4. Foreign body giant cell tumors are more common and usually benign.

5. Tumor giant-cell growths are uncommon and less benign.

6. Giant cells have been found in pulmonary metastases.

7. The marked differences of opinion regarding these tumors may be due to a failure to differentiate between the giant cells.

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NOTE: Since completing the above an important further contribution has been made by M J Stewart Lancet Lond 1914 November 28

I am indebted to Professor C H Bunting for his interest in these tumors.

X-RAY DIAGNOSIS IN GYNECOLOGY WITH THE AID OF INTRA-UTERINE COLLARGOL INJECTION

BY I. C. RUBIN, M.D., New York

THE idea of employing the X-ray for diagnosis in gynecology is obvious in view of the multiple uses to which this agency is put in the other specialties. The diagnostic employment of the X-ray in gynecology has thus far however been very limited. Certain lesions of the bladder and the pelvic ureters can be definitely revealed by the X-ray with or without the aid of metallic solutions. In obstetrics the roentgen ray has been employed to demonstrate deformities of the bones of the pelvis and to determine the position of the fetus *in utero*. The writer knows instances where dermoid tumors in young individuals have been diagnosed by means of the X-ray.

USE AND LIMITATIONS OF THE HYSTEROSCOPE AND THE POSSIBILITY OF CATHETERIZATION OF THE TUBES

For some time attempts have been made to imitate the examination of the uterus by method which were applicable to the bladder. The David hysteroscope represents perhaps the best example of an electric lighted instrument for examining the cavity of the uterus. By this instrument it was hoped that catheterization of the fallopian tubes would become possible and thus obviate the necessity of an exploratory laparotomy. The purpose of such a catheterization was of course both diagnostic and therapeutic. Were it possible to catheterize the tubes we would probably be able to cure many cases of sterility. Without entering into the limitation of the hysteroscope we may nevertheless point out that obstruction e.g. a large submucous myoma may prevent the introduction of such an instrument.

Catheterization of the tubes however can never be successfully carried out even if no uterine obstruction is encountered for the following reason: The uterine ostium of the fallopian tube is exceedingly small by com-

parison with the mouth of the ureter within the bladder. The probe or catheter would have to be of such delicate construction that its passage may prove dangerous from breakage or perforation. The fallopian tube is wider as the abdominal end is reached and it is well known how difficult it is even by sight to pass a probe through the isthmus end not to speak of the intramural portion of the tube lumen. In doing this maneuver from within the abdominal cavity it is absolutely essential to steady the fibrinated end of the tube to enable the probe to pass through the lumen. An artificial passage is very easily made owing to the anatomical peculiarity of the endosalpingium. This takes place even under the guidance of the eye. Some other means must therefore be found to determine before operation the patency or non patency of the fallopian tubes.

In dealing with cases of sterility particularly of long standing one is often puzzled regarding the condition of the tubes. The following is an example of such a case.

A B 36 years married 15 years no children no miscarriages. As far as patient remembers she had no irregularity in her menses which are of 4 to 5 day duration and are not associated with pain. The patient had been seen by a practitioner who advised a curettage and dilatation and the introduction of a stem pessary. The advisability of a plastic operation on the cervix was also under consideration. On examination the cervix was plump the external os was elliptical. The sound entered easily in an anterior direction for a distance of three inches. There was no discharge no gonococci were found in the smear from the cervical secretion. It was evident that nothing could be gained by the proposed operation. The tubes were not palpable. There was palpable enlargement of the ovaries. The semen contained active spermatozoa. From the history there was every assurance that the sexual act was complete. The dates were complete in regard to only one thing namely the tubes. Might it then be occluded at some point so as to block the transportation of the ovum of the uterus? Patient would not tell the truth in anything could be done for her except to explore the tubes. She readily consented to the paratubal which revealed the following in appearance: 1. Patent

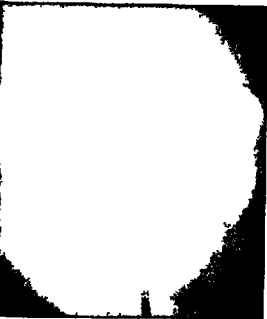
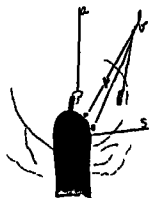
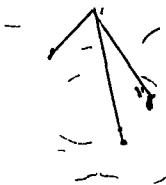


FIGURE 1



FIGURE 1



Schematic illustrations

Fig. Case 5. Patient age 35. Total menorrhagia. The specimen of the tumor is shown in the normal narrowing of the tube. Not also the relation of each tube. On the left side of the tube is a large polypoid growth. The specimen of the tumor is shown in the normal narrowing of the tube. Not also the relation of each tube. On the left side of the tube is a large polypoid growth.

Fig. Case 6. Patient age 35. Total menorrhagia.

First section of cervix (5 per cent). Instrument removed. Not shown. There are found however shadows of phleboliths or calcified glands.

Fig. Case 6. Second section about 1 cm of cervix. Instrument removed. Not shown. There are found however shadows of phleboliths or calcareous glands. a, speculum.

INJECTION OF COLLARGOL INTO THE UTERINE CAVITY AND FALLOPIAN TUBES

The operation led us no farther toward the solution of the problem of sterility in this instance. On the other hand we could not help feeling that there should be some way of determining the patency of the tubes without resorting to an exploratory laparotomy. Collargol naturally suggested itself in conjunction with the X ray. Theoretically it was fraught with greater danger than when employed in pyelography, cystography or as employed to determine the patency of the vas deferens and seminal vesicles. In all these instances the collargol is introduced into closed sacs.

Possible dangers. Injected into the uterine cavity and through the tubes the fluid might escape into the peritoneal cavity. In this way infective material might be carried into the peritoneal cavity and possibly lead to a peritonitis while aseptic material similarly transported from the uterus and tubes into the peritoneal cavity might eventually stimulate an aseptic adhesive localized peritonitis.

The first objection could be overcome by first selecting the cases: active infections of the uterus and tubes would obviously be contra indications to the use of the test. In healed lesions of the tubes in tubes closed off by external adhesions or by an internal agglutination of the endosalpinx no harm could result from the injection. In instances of pyosalpinx or hydrosalpinx there would be practically no more danger from the injection than there results in pyelography. Of greater importance was the possibility of causing harm in non infective cases. While the bactericidal properties of the collargol could be counted on to neutralize mildly infective material the production of adhesions in the pelvis by virtue of a possible irritating action upon the peritoneum would prove an undesirable complication or sequel of the collargol injection.

Theoretically too it remained to be proved that the fluid would pass through the tubes in every instance of normal anatomical conditions. From reports in the literature fluid has been known to pass through the tubes into the peritoneal cavity during irrigation in puerperal uteri and in uteri after abortion.



Fig 3 Case 6

This has been regarded as accidental. The practice is nevertheless in vogue of irrigating as a routine measure after curettage. In gonorrhoeal infections of the uterus and tubes iodine is often injected into the uterus in the hope that it will reach the tubes.

In order to prove that the method would be safe as well as practical it was essential to establish: 1 The non toxicity of the fluid when injected into the peritoneal cavity. 2 The amount necessary for the test. 3 The maximum strength of the solution. 4 The non irritating effect on the peritoneum.

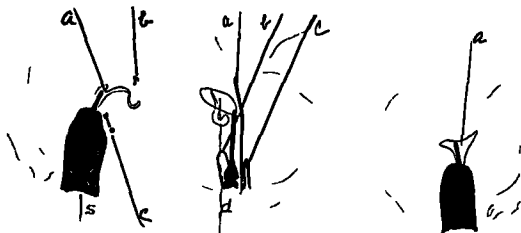
Toxicity of collargol. From our knowledge of the action of collargol solution in the treatment of certain septic conditions it is apparent that the system tolerates collargol very well even when injected directly into the blood. Cr  d   originally employed it in 2 per cent strength and injected 40 to 60 ccm into the blood-stream; later he recommended even a more concentrated solution i.e. 5 per cent. The amount necessary to pass through both tubes into the peritoneal cavity in cases where there is no abnormal dilatation of the uterus or of the tubes was found to be 3 ccm. The injection of collargol in the strength of solution and in the quantity required for our



Fig 4 Cas 6



Fig 5 Case 7



Schematic drawing for Figs 4, 5, and 6

Fig 4 Case 6 Third injection ccm of per cent collargol Only 1 ft 1 be. retracted speculum and syringe / teru nd left t be b and phlebectasis or calcareous glands.

Fig 5 Case 7 Double uterus nd cervix with sept to vagina a terine sound as far as fund of right uterus

b ten culum left cervix tenaculum on right cervix d left half f doubl uterus Note its size nd position relation to th yringe The tube is distended

Fig 6 Case 8 Bilateral salpingectomy 1 years previously uterus t bes bcent

purposes would therefore very probably never prove lethal

To establish the safety of the intraperitoneal injection 5 ccm of collargol of a 15 per cent solution was introduced into the peritoneal cavity of two rabbits. The animals were unusually quiet and refused food for twenty four hours after that time they behaved normally (Dr J Novak who kindly observed the animals reported that their condition subsequently was normal). Since the amount injected in these rabbits did not prove toxic it is fair to assume that a smaller dose introduced into the uterus for diagnostic purposes should not be attended with toxic effects. It was further necessary to prove that collargol injected into the uterus will pass into the tubes and then into the peritoneal cavity.

Percentage of collargol necessary. The first studies made were on cadaver material of very old subjects. The solution used was 15 per cent to 20 per cent in strength. The shadows obtained were very dense. I found also that in certain instances the fluid did not go through the tubes. On investigation this was found to be due to an obliterative endosalpingitis not uncommon in senile individuals. The solution was also too thick to pass through these tubes because later the same tubes permitted the passage of an aqueous solution of methylene blue. I found also that a 5 per cent solution of the silver salt did go through when a 15 per cent or 20 per cent solution did not. When I tried the more concentrated solutions and found they did not pass through the tubes of the uteri I had at my disposal for the experiments I conceived the idea of employing the injection of collargol into the uterine cavity for the purpose of diagnosing intra uterine conditions especially in these cases where the introduction of a uteroscope was not feasible.¹ For such purpose the method can be used without any danger as later observations proved.

The 10 per cent collargol solution gives satisfactory pictures and for illuminating the tubes proves sufficient. A more concentrated solution is not likely to pass through while a 5 per cent collargol solution is not satisfactory. In a series of cases in which this percentage



Fig 6 Case 8

was tried the pictures were negative as far as collargol shadows were concerned.

Concerning the irritating effects on the peritoneum I have injected collargol in eight cases in strengths varying between 5 and 10 per cent. One patient received three injections. The effects of a peritoneal irritation should in general be manifested by (1) pain (2) tenderness and abdominal rigidity (3) abdominal distention (4) temperature elevation and increase of pulse rate (5) gastric disturbance (6) disability (7) the development of an inflammatory exudate and (8) disturbance in ensuing menstrual periods.

For the method to have a clinical value these conditions and symptoms or at least the more serious ones must be absent. My object was next to test the clinical application of the method in relation to possible untoward symptoms and sequelae. It was also desirable to ascertain whether the injection itself would prove painful.

The cases reported in this article are from the gynecological service of Beth Israel Hospital. The following is the record of the first intra uterine collargol injection.

CASE 1 Sterility femoral hernia and small uterus L II age 33 married 12 years no

shadows as before Collargol injection (10 per cent used) September 2 About 5 ccm injected under pressure Patient immediately complained of pain and vomited twice The picture (Fig 4) is practically that of Fig 3 showing however more collargol in the uterus The left tube alone is outlined The end of the tube approximates those caterpillar shadows as seen in Figs 2 and 3 The temperature rose to 102 fell next day to 100 and then to normal the following day The pulse was never higher than 90 She was discharged four days later When seen at the office there was no swelling in pelvis—no evidence of a local peritonitis

CASE 7 Double uterus and cervix cum vagina septa D C No 2 270 Age 22 married 7 months In hospital September 8 to September 12 (Patient referred by Dr A Granet) Menses began at 13 years of eight days duration extremely painful especially two days before onset Past two menstrual periods were associated with agonizing pain Coitus was difficult till partial excision by Dr Granet of the vaginal septum On examination broad septum (anteroposterior) screens left cervix This when exposed to view appears fairly plump Sound enters the cervical canal for a distance of about one and one fourth inches then meets with obstruction This overcomes sound enters a wide uterine cavity to extent of three and one-fourth inches The right cervix is completely hidden from view when pulled out with tenaculum it appears about one half as large as that of the left uterus Into this uterine cavity the sound enters two and one half inches In each instance the introduction of the sound was followed by the escape of dark blood especially was this evident from the left uterus The left uterus by palpation was also considerably larger than the right Collargol 10 per cent injection into the left uterus September 11 1914 A sound was at the same time introduced into the right uterus as far as the fundus while a bullet forceps marked the external os (Fig 5) The left uterus is shown considerably distended and lemon shaped The outline of a somewhat distended tube shows also (possible hematosalpinx) No rise in temperature or increase in pulse rate but pain followed the injection for two hours after which there was no further discomfort

CASE 8 Absence of tubes (post operative) Patient had double salpingectomy two years previously had menstruated once two months after operation but never again Collargol (10 per cent) injection September 11 1914 No pain at injection the patient had not been prepared as for a skiagraphy The plate shows a triangular shadow (Fig 6) corresponding to the uterine cavity tapering off at about the border the tubes do not show Patient went home immediately after the skiagraphy and was seen three days later at the office there was no mass or any indication of trouble

TECHNIQUE

The patient is placed on her back on the X ray table her knees flexed and separated

The use of the bivalve speculum saves the need of an assistant it is therefore preferable The cervix is exposed cleaned and then painted with iodine The superior aspect of the anterior cervical lip is grasped with a tenaculum A sound is introduced to get an idea of the direction of the uterine cavity and of its approximate size The syringe used is a modified Braun intra uterine sound with a Record barrel It should be tried first and should work smoothly The syringe should contain 5 ccm of collargol solution (10 per cent) The intra uterine nozzle is introduced to just above the internal os The X ray plate is then put under the sacral region of the patient The X ray operator should be ready when the injection is to be made The injection should be made without undue pressure—3 mm mercury is all that is required When the sound does not fit closely into the cervical canal I have added the elastic conical rubber urethral point which may be fitted into the external os When the fluid is observed to flow outside of the uterus it is well to stop The excess should be wiped away The speculum is partly withdrawn so as not to overlap the collargol shadow and the X ray is then taken

After the X ray exposure an attempt should be made to recover by suction the fluid within the uterus Often more than half is recovered The remainder is for the most part discharged within the next twenty four hours Should there be pain it is advisable to stop the injection Pain usually denotes distention of uterus or tube or escape into the peritoneal cavity In either event it is an indication that sufficient fluid has been injected for diagnosis When in doubt as to the presence of an infective process in the uterus or tubes the patient should be kept quiet for a day or two and observed When there has been no pain there is no objection to permitting the patient to go home

SUMMARY

While these cases do not represent the great variety of gynecological conditions in which the X ray may be used in conjunction with

The collargol solutions used were kindly prepared by Miss S F I of the pharmacy in the hospital. The X ray was given by Dr. J. H. H. of the radiology department.

collargol they are sufficient to permit of certain conclusion regarding the value of this method in gynecology. The first case in which the method was tried left nothing to be desired. The injection was not painful, the picture was clear and the course after injection was unattended by any ill effects. The X-ray picture served incidentally to differentiate an extra uterine tumor from an intra uterine tumor which the ordinary physical method of diagnosis had failed to do. This first case proved so satisfying to all demands made of the method that it bade fair to be a valuable additional means of physical diagnosis in gynecology. The temptation to publish this first case was offset however by the possibility that this may have been an ideal case for the test. It was necessary as well to establish contraindications and further to control the success of the method. It was next endeavored to try a weaker solution of collargol with the view of diminishing the danger from the silver salt as much as possible. Accordingly in the next few instances a 5 per cent solution was employed. With this weaker solution we risked injecting a larger quantity than used in the first case. The cases in order were: (1) Double diseased adnexa, (2) ovarian cyst with incomplete abortion, (3) fibroid uterus, (4) small uterus (sterility) with subacute salpingitis, and (5) a case of total amenorrhea in a woman 32 years of age and married 12 years. In this series of cases we learned that with the tubes occluded, in Case 1 (post-operative) the injection of collargol solution was absolutely safe that with the tubes patent the fluid may and does pass into the peritoneal cavity without however causing an appreciable peritoneal irritation. The omentum in such instance serves to take up the collargol as it would behave in the presence of some other foreign substance as lamp black, etc. The post-operative recovery in these cases was satisfactory. We also found that in the presence of an infected tube which is patent there may be symptoms and signs of a peritoneal irritation as in Case 4. The effects persist over in thirty-six to forty-eight hours without the necessity of

operative interference and no further ill effects are noted. Also that in the presence of an incomplete abortion or a febrile post-abortive endometritis a rise in temperature may be noted as in Case 2. There was no peritoneal irritation however.

In none of these cases was the menstrual cycle disturbed. They all reported the onset of the next period at the regular time.

In Case 3 of total amenorrhea the patient received two intra uterine injections on two different occasions and each time she was permitted to go home immediately after the injection. She had no pain or discomfort.

The X-ray picture in those instances where 5 per cent collargol solution was used were not satisfactory indicating that a stronger solution was necessary. We then reverted to 10 per cent collargol solution which gave satisfactory pictures.

Case 5 that of total amenorrhea who had had two previous injections then received 5 ccm. of 10 per cent collargol solution. The fluid was injected under considerable pressure as it was thought the tubes were closed. This injection was attended by colic and vomiting. Pelvic pain lasted a few hours. There were no manifest symptoms of peritoneal irritation. There was no doubt however that the forcible injection caused the colic. The quantity employed was too much, some of the fluid probably being forced into the parenchyma of the uterus if not causing pain by distention of the left tube.

I had previously demonstrated that with the tubes closed it is possible to distend an extirpated uterus. In the living when this obtains it is most probably attended with violent colic. The 10 per cent collargol solution was further employed in illuminating the left uterus of an asymmetrical double uterus and in one case to show the uterine cavity in a patient who had had a bilateral salpingo-oophorectomy two and one half years ago. This patient was permitted to go home immediately after the injection. X-ray picture taken one week after injection failed to reveal any deposits or masses of collargol. From these cases it may be deduced—

1. That a 10 per cent collargol solution is essential for a satisfactory X-ray picture.

- 2 That under mild pressure (i e about 3 mm of mercury) the injection is not attended by pain
- 3 That it is desirable not to inject more than 5 ccm of the solution in the average case especially in cases of sterility with so called infantile uterus
- 4 That the cases should be selected One should make sure there is no active infection of the uterus or the tubes Post abortive conditions with fever are contra indications
- 5 That the method is safe as far as peritonitis is concerned even in these cases and in properly selected cases should be absolutely safe
- 6 That there are no bad sequelæ i e no

gross pelvic adhesions or exudates as determined by bimanual palpation have been found subsequent to the collargol injection

7 That the menstrual cycle is not disturbed

8 That the method is of aid (a) in the diagnosis of the patency or the occlusion of the tubes (b) in differentiating intra uterine from extra uterine tumors as intraligamentous cyst from myoma (c) in certain malformations of the uterus and possibly also of the tubes (d) in determining whether a single or bilateral salpingectomy had been done on a patient that had previously been operated (e) in studying true flexions of the uterus and mal developments.

HÆMANGIO-ENDOTHELIO-BLASTOMA OF THE STOMACH¹

By J GARLAND SHERRILL, M D A D I S GRAVES M D LOUIS ILL & TUCKY

TUMORS of the stomach are not common A hamangioma of the stomach is exceedingly rare The report of this case is of interest and seems justified by the fact that very few similar cases have ever been placed on record The clinical aspect of the case is submitted by Dr Sherrill and the pathological findings are presented by Dr Graves

Mrs — white age 31 came to me in the fall of 1907 Family history negative with the exception of one sister upon whom I had just operated for carcinoma of the cervix uteri The patient's husband had acquired syphilis prior to his marriage but had taken vigorous treatment for three years and was apparently in good health

Personal history She was the mother of one child and had had two miscarriages Some time prior to consulting me she fell striking her epigastrium against the corner of a table Soon after this she began to complain of loss of appetite nausea symptoms of indigestion and epigastric discomfort These attacks occurred more frequently at night and during the attacks she would regurgitate her food and there were eructations of salty stuff Once or twice she vomited blood She had more or less constant pain in the abdomen which was sometimes relieved by eating Oftentimes she could not go to sleep at night until she had taken a cracker and some milk She developed marked anemia lost flesh and presented a peculiar cachexia

When examined at this time she was tender over

the region of the stomach and a palpable thickening could be felt in the epigastrium The mass moved up and down with respiration At times it could not be felt The blood examination at this time was negative to malaria 3 500 000 red cells 7 000 leucocytes no differential count being made hemoglobin 30 per cent She was given a test meal but the stomach was empty thirty minutes afterward therefore the examination was not satisfactory

A diagnosis of gastric ulcer was made and the patient was sent to the hospital with a view to bringing her into condition for operation if relief did not follow treatment Rest in bed carefully selected diet and treatment of the ulcer brought prompt improvement Subsequently this improvement seemed to be hastened by antisiphilitic treatment

She came under observation once or twice during the next five years but was at no time under my constant supervision Her condition remained fair but the mass persisted sometimes palpable some times not always following the respiratory movements and also quite freely movable When she consulted me Oct 6 1914 the mass had reached almost the size of a kidney and had the wide range of mobility seen in floating kidney This was so marked that there was some doubt expressed as to the attachment of the growth It was so readily pushed into the right loin that a strong suspicion of movable right kidney existed At times it was earned almost but not quite as far to the left side as to the right Careful examination of the right kidney however enabled us to feel this organ normally placed Over the growth slight dullness was elicited on percussion while tympany was



Fig Hamangioma endothelioma growing on gastric ulcer

obtained both above and below. Her digestive disturbance when she last presented was not marked consisting of soreness in the epigastrium with some eructations and a sensation of fullness. Her husband informed me that about two years ago she had an attack at night. At this time she felt weak, she yawned, her vision was impaired and she had a

slow feeble pulse. He took these symptoms to be the signs of internal hemorrhage. Within thirty-six hours the stools were black and blood was detected in them. Her anemia improved at times and then recurred. The lump in the abdomen seemed to enlarge and was more tender at her menstrual periods. A Wassermann test was negative. Blood examination: hemoglobin 50 per cent, red cells 4,500,000, leucocytes 6,000, large lymphocytes 8 per cent, small 16 per cent, polymorphonuclear leucocytes 72 per cent, eosinophils 3 per cent, and myelocytes 1 per cent.

Diagnosis: Gastric ulcer with a growth, probably a tumor, although the possibility of a floating kidney was considered.

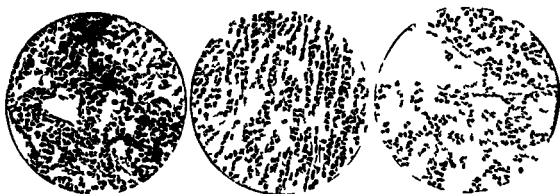
On opening the abdomen on October 5, 1914, a reniform mass growing from the greater curvature of the stomach near the pylorus and covered by the greater omentum presented to view. This mass was mottled purplish in color and had a rather broad attachment to the stomach. It moved freely with that organ, having no other attachment. A small glandular enlargement was found in the omentum near the base of the tumor. A portion of the stomach about four inches in length along the convex border and two and one-half inches along the concave border was removed together with the mass and a portion of the upper part of the duodenum including the pylorus and



Fig 2 X-ray taken after operation ten minutes after barium meal



Fig 3 X-ray taken after operation ten minutes after barium meal



Figs 4 5 and 6 Sections from hœmangio endothelio blastoma

the gastroduodenostomy was completed in the usual manner. It was smooth on the surface, somewhat firm near its attachment to the stomach, without induration and soft in consistency along its distal portion.

Upon examining the growth after its removal, three small openings in the mucous membrane were noted, one of which extended entirely through the gastric wall and communicated directly with the inside of the growth. Through this opening the little finger could readily be passed. The center of the growth seemed to be broken down but contained only delicate tissue and no appreciable fluid. It has not been my experience to find a condition of this kind existing with gastric ulcer. I have on several occasions found the adjacent stomach wall markedly thickened and indurated; the induration even extending as far as the liver in one case, but I have never found a distinct tumor growing out from the stomach wall with its attachment at the site of an ulcer. There was a strong suspicion that this might prove to be a syphilitic growth, but this was disproved by pathologic examination.

A feature of great interest in connection with the case is the relation between the injury suffered by the patient and the devel-

opment both of the ulcer and of the tumor. Traumatism has been known to play a very important rôle in the development of gastric ulcer, especially those that have been produced experimentally. Traumatism is also a known factor in the development of certain forms of neoplasm. Unfortunately, it is not possible to state positively whether the growth preceded the ulcer or developed subsequently. From the history I believe the ulcer occurred first; certainly it was present before the patient came under my care.

Another rather interesting feature in connection with the case is the length of time that this condition existed and it perhaps would have some bearing upon the prognosis. We would scarcely expect a malignant growth to last for six or seven years without having advanced to greater size and this would lead us to the conclusion that the growth was of a benign nature, which agrees with the view expressed by Mallory.



Fig 7 Hæma groma of stomach, tumor to left showing line of attachment of stomach



Fig 8 Stomach everted showing site of ulcers

Since the operation the patient has improved and states that she feels wonderfully relieved and eats every thing without inconvenience. She is improving in color and there has been some increase in weight. An X ray examination shows barium passed out of the stomach in the usual time. There is slight but not material irregularity at the line of suture which could scarcely be made out in the skinogram.

The pathological report by Dr Graves is as follows:

The specimen consists of the pylorus with adjacent portions of the stomach and duodenum the piece of gastro intestinal tract measuring 10 cm in greatest length. In the mucous membrane of the stomach about 2 cm from the pylorus are three small holes the largest 2x5 mm with sloping sides and slightly thickened edges. Thus lies directly over a mass ovoidal in form 7 cm in greatest diameter soft covered with a glistening serous membrane with one adhesion between the tumor mass and the external surface of the gut. The mass varies in color from pinkish gray to dark purple in spots. On section cut surface is moist glistening, soft homogeneous and in the two thirds adjacent to the gut is pinkish gray with scattered spots of very dark red. The farther one third is uneven broken down and dark red.

Microscopical description. Different sections show that the tumor consists chiefly of more or less polyhedral cells with round or oval rather faintly staining nuclei. Their cytoplasm is non-granular and they do not have fibroglia fibrils. The cells in places are closely packed in masses. In other places they are arranged in strands or concentric whirling bundles separated by fibrous stroma. In some regions the tumor cells surround spaces containing erythrocytes. These lining cells are one or more layers thick and in them an occasional leucocyte is seen. Some of these vascular spaces are fairly large but most are small. This picture is varied by areas in which lumina containing erythrocytes occupy the greater portion of the field and are separated only by single strands of endothelial cells. A few of the vascular spaces are extensive although lined with only a single layer of flat cells. The tumor is sharply circumscribed and surrounded by gastric mucous membrane.

Diagnosis: Hemangio-endothelioma.

Mallory in *The Principles of Pathologic Histology* p 370 on this subject says: They are often congenital and frequently perhaps always arise from abnormalities of the blood vessels especially from vascular naevi. They occur most often in the skin and subcutaneous tissue but may originate also in

muscles nerves the liver spleen brain bone-marrow etc. They are to be regarded on the whole as benign growths although locally destructive because their manner of extension is by infiltration of surrounding tissues and by growths within and along blood vessels. Apparently but one case of metastasis is on record.

The following reports have been found in the literature:

Robert T Morris¹ in a report upon *The Effect of X ray Treatment in a Case of Endothelioma of the Stomach* says that some months ago he did a posterior gastroenterotomy to relieve pyloric obstruction in a case of supposed epithelioma. The growth was so extensive in character that a radical operation was deemed inadvisable but a section was removed and submitted to Dr Aspinwall Judd who pronounced it an endothelioma. Under X ray treatment the growth had apparently disappeared entirely the patient had gained about fifty pounds in weight and is now practically well but may have a recurrence. Epithelioma and endothelioma Dr Morris says simulate each other so closely that they are not to be distinguished except by the aid of the microscope and if of the latter type the growth was amenable to the X ray treatment it was a fact worth keeping in mind.

In an article published² in the *Riforma Medica* July 1 1903 on *Endothelioma of the Stomach Situated near the Pylorus*, Cignozzi summarizes the clinical features of endothelioma of the pyloric end of the stomach as follows: The disease as a rule pursues a chronic course (six years in Brissaud's case and ten years in Oettinger's case). The symptoms of stenosis develop gradually until the clinical picture of pyloric obstruction (vomiting of food) without previous haematemesis or melæna come into view. A smooth pyloric tumor which is movable and does not produce any metastasis nor any emaciation such as occurs in cancer is also characteristic of these tumors. Accurate diagnosis can only be made on the operating table.

END-TO-END ANASTOMOSIS OF THE AXILLARY ARTERY

WITH REPORT OF A CASE

By E. OWSEY GRANT, M.D., LOUISVILLE, K.C., KENTUCKY

THE infrequency of the reports of cases of end to end anastomosis of the axillary artery for bullet wounds is one of the principal reasons for putting this case on record. In its consideration however several factors have appeared on which I can find no previous literature but hope that some sufficient explanation will be forthcoming. Since Murphy reported the first successful suture of the axillary artery end to end by the invagination process in 1897 there have been several attempts and some successes but as these cases of complete severance occur only rarely the literature is not so replete as might be expected. The case is as follows:

G. W. V. shot himself with a .32 caliber revolver with suicidal intent on May 26, 1914. The bullet entered the left side of the chest one and one half inches outside of the left nipple line and emerged from the back five inches external to the second dorsal vertebra. He was seen by a physician and sent to the hospital. The hemorrhage was not profuse though there was considerable swelling in the left axilla. The radial artery on that side (the left) was not palpable; the pulse on the right was full and strong. The mental condition of the patient was clear; the left hand was cold and there was no sensation in it. No pulmonary symptoms intervened and a diagnosis of rupture of the left axillary artery was made. The patient was brought to the operating room within an hour after the injury and the following operation performed:

Operation. An incision was made in the axilla and several large blood clots expressed. No bleeding point showed itself. Deeper dissection revealed the distal portion of the axillary artery but no pulsation was discernible in it. Careful palpation revealed the proximal stump of the axillary artery buried in a clot and beating rhythmically. The proximal end was buried far in the axilla and the point of severance was in the first portion of the axillary artery. The axillary vein was then examined and found to be intact. The nerves of the brachial plexus were not visibly injured. Clamps covered with rubber were then put on the two ends of the artery and the clot which extended for a distance of a quarter of an inch was milked out of the proximal end of the artery. With this clot was expressed an entire circular portion of the artery one eighth inch in length which was apparently the portion that had been shot away.

Immediately after the clot was expressed there was a free gush of blood from the artery but the bleeding was promptly controlled by rubber covered clamps. The distal portion of the artery tended to bleed but little though it had no visible clot in it and it would have perhaps been better if the rubber covered clamps had not been applied at all as after results showed. The somewhat ragged edges of the wound were now trimmed away as parsimoniously as possible and the edges approximated by exerting traction on the adventitia at some distance from the site of the anastomosis. The edges were approximated by the Carrel method with the overhand stitch. The needles used were Kirby No. 16 sharps and the thread No. 000 China silk split into its component threads and treated with vaseline. The clamps were removed and no hemorrhage occurred. Pulsation was palpable for an inch and one half below the point of the anastomosis and here a large branch came off. No pulse was palpable in the radial or in the brachial. The wound closed in the usual manner without drainage and the arm fastened to the side of the chest.

Post operative history. Recovery from the anesthetic was good. Temperature rose to 101 the following day but subsided. Some pain in the arm very little edema and the temperature on the affected arm slightly below normal. Patient had considerable pain in the arm but sensation of heat and cold sharp and dull was acute even in the tips of the fingers. There was a faint pulse in the radial on the eighth day but this disappeared again and later and only at intervals and in certain positions was the pulse palpable. The course however was a steady improvement and six weeks later there was a distinct pulse in the radial which is apparently not a recurrent pulse. There is still marked neuritis in the fingers which is slowly improving under massage and electricity. The circulation in the fingers is apparently normal though the motion is not quite perfect. A report from the patient twelve weeks after the operation says there is much improvement and that the nutrition of the hand is perfect but there is some occasional pain in the arm.

The case seems to me to present two problems that perhaps cannot as yet be definitely answered. The first is the question of the pain in the arm. Is this due to the disturbance of the circulation of the arm or to a direct injury to the great nerve-trunks at the time of injury? As has been said no visible lesion of the nerves could be seen but it is seemingly impossible that a bullet should pass through this

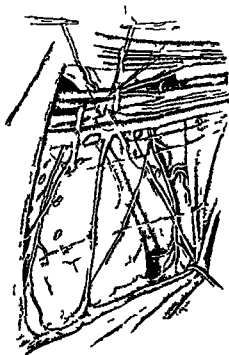


Fig. 1. Drawing of artery and position of the suture.

portion of the axillary artery and not damage very materially the great nerves. There surely can be no complete severance of the nerve-trunks for the patient has had a sense of touch and an ability to distinguish between sharp and dull ever since two or three days after the operation.

On the other hand the blood supply has not been interfered with enough to show the least impoverishment of the muscle or skin and it is unlikely that the nerves would be so easily affected. Apparently neither the trophic nor motor nerves are seriously impaired only the sensory being affected. In the dogs on which I have performed experimental transfusion using the femoral artery there is always a paralysis for a week or less but this improves and by the expiration of three weeks is entirely restored to normal. In these cases there is of course no injury at all done to the nerves and the affection must be the

result of the deprivation of the blood supply to the nerves.

The second problem is: Why does the circulation i.e. the pulse delay in its appearance for a period of days? The reports of cases in the literature show that in various arterial end-to-end anastomoses only one or two have had an immediate return of the pulse and in the remainder the appearance dates from two to twenty days after the operation. It must also be borne in mind where the wound is not complete that there is usually a partial constant stream of blood through the vessel and even an end to end anastomosis done for this type is more likely to result in immediate return of pulse as there is less time for a thrombus to form. The delay in the appearance of the pulse can be due to one of two factors (1) either there is a thrombosis of the artery distal to the suture and this is later canalized or (2) there is an establishment of the collateral circulation and later a return to the main trunk, or in other words, a recurrent pulse. After complete transverse rupture of a large artery the distal portion tends to bleed but little if any because there is no *largo* to force it. However there is always some blood left in the artery and this might easily clot and obstruct the vessel. Should this occur there is only one way in which the circulation may be established through the accustomed channel after the artery is joined again and that is by canalization or some similar measure as autolysis, absorption or other allied process. Upon the time necessary to produce the passageway through this clot would depend the length of time that the pulse would be absent. For example an injury sutured before there had been an opportunity for the blood to clot would undoubtedly produce a pulse in the most distal portion of the artery at once while an artery sutured one to twenty hours later would exhibit a delay due to the thrombus that would have formed and the thrombus might later be canalized or the thrombus might not extend proximally farther than a few inches and the collateral might bring in the flow at a later period. How long might be required for the canalization I do not believe has ever been accurately determined.

but I should think from opinions expressed not under a period of weeks (Adam's I athol ogy) In speaking of canalization it is used in this paper to include the more specific terms organization absorption autolysis etc It is of course possible that the swelling of the tissues might obliterate the pulse for a time after the anastomosis had been made but that would hardly be great enough to exclude the pulse altogether for a period of days

Since writing this article I have had an opportunity to suture the brachial artery in the upper third of the arm In this case the artery was cut three-fourths of its circumference The bleeding here had been profuse and had to be controlled by a tourniquet for three quarters of an hour previous to operation A lateral suture was made in the artery with the same fine silk and needles as mentioned in the first case No leakage at all The pulse in the radial did not return for eighteen hours after the operation though it was present below the point of suture immediately after suture and now (three days after suture) there is a gradually increasing volume which at the present time is almost as good as that in the unaffected arm There has been less pain in this case than in the case above reported although the median nerve was completely severed The nutrition of the hand is perfect and no oedema There is anaesthesia in some parts of the hand supplied by the median nerve This case is cited as another instance of the pulse not returning immediately although there was only a lateral suture necessary and the flow of blood had been checked only so long as the tourniquet was in position but this was enough to form a clot which had later to be changed in some way within eighteen hours in this case This type of case is where the circulation is delayed for a long time shows how important it is, even in cases where the pulse may never return to make an anastomosis rather than a ligation because the immediate results are not the measure of the full success

I wish to express my thanks to Drs Mau pin and Burnett for their assistance and to

Miss Edna Dolinger for her splendid representation of the operation pictorially

Appended is a bibliography as complete as I can find of the suture of the axillary artery This includes many lateral sutures In none can I find any explanation of the delayed pulse or the accompanying nervous symptoms A splendidly arranged bibliography of all the end to end sutures of various arteries previous to 1913 is to be found in an article by Buchanan in SURGERY GYNECOLOGY AND OBSTETRICS 1912 XV 648

BIBLIOGRAPHY OF ALL REPORTED SUTURES OF THE AXILLARY ARTERY UP TO DATE

END TO END

- MURPHY J B Invagination Revolver wound Feeble radial pulse before and after Compt rend du XII Cong Internat de med 1897
BROTHMAN E J Invagination St b wound Pulse same day Surg Gynec & Obst 906 II 410
LIVER E Tra splantation of splenic vein to axillary artery Death in 5 days Autopsy showed a patulous vein with some thrombosis Arch f klin Chir 907
GO LIT JOSEF Three fourths of circumference sutured for stenosis neurysm Pulse not day War klin Wchnsch 1909
SCHMIDEN V Injury to operation Atheroma Pulse appeared for 10 minutes and then disappeared Recovery Berl klin Wchnsch 1910
CABLE G W Injury to operation Recovery of arm report a pulse Unreported case

LATERAL SUTURES

- RICARD Two cases Lateral suture with catgut Pulse equal 1 week 1 case no report the other complete recovery with good pulse B ill Soc de Chu d Lyon, 1899 Gaz de hop 90
DURANT Two cases Lateral suture with catgut case cured one result unknown These d Lan 1899
HALSTED Lateral suture with catgut Oblique wound three fifths of circumference of ring operated Recovery with no disturbance of circulation Med Rec N Y 909
MATIAS Lateral suture Wound during operation Recovery Ann Surg Phila 903
FICH M Late l suture Wound during operation Recovery These de Montpellier 1903
BREW R (ZO E Lateral suture of wound during operation Recovery Ann Surg Phil 1904
CAPLESCO POE Lateral suture with three parts 15 parts Wound during operation Recovery Presse med Par 906
SCHMIDEN V Lateral anastomosis of wound during operation by Carrel-Stich method recovery Rev Ch Par 909
DJEMIL RA T Lateral suture one with 15 parts, one with four parts 15 cm length Recovery Compt rend du XII Cong Internat de med 1897

ARTHRITIS OF THE JOINTS OF THE HAND FOLLOWING COLLES FRACTURE¹

By PRESCOTT L. BRETON, M.D. BUFFALO, NEW YORK

In the *American Journal of Orthopedic Surgery* for November 1911 appeared an article by the writer entitled "Traumatic Arthritis as a Late Complication of Fractures of the Upper Extremities." This article discussed at length five cases seen in practice in which there developed from three to six weeks after a fracture a progressive inflammation of the joints of the fingers and wrist. This inflammation evidenced by swelling, severe pain, edema, stiffness and muscle atrophy increased to a climax during a period of two to four weeks and then more gradually subsided. The most characteristic feature was the inability of the patient to approximate the finger tips to the palm in other words to make a fist. During convalescence the pain was in each case marked on attempted motion, the grip weak, the circulation poor. An atrophic appearance of the part was evident on inspection and an atrophic appearance of the bones on X-ray examination. The patients were all females well along in life and in most of them there was a tendency to arteriosclerosis. Four were cases of Colles' fracture and one of fracture of the neck of the humerus. The literature was searched at the Army Medical Library in Washington but nothing found to explain the condition.

Since 1911 when this article appeared the writer has closely followed four more cases of this nature. A fifth case the only man in the series was seen for a few moments only in a hospital in Philadelphia but the history was typical and the diagnosis self evident on inspection of the stiff hand. Three of the five had had Colles' fracture, one fracture of the neck of the humerus and one the male dislocation of the head of the humerus. These cases varied in age from 43 to 70 and four showed arteriosclerosis. This second list of five patients varies from the first set of five in the facts that one case died before the climax of the condition was over

and that one was a male. These cases were in good health with little or no history of a rheumatic nature. The fractures were well reduced, the splinting had not been too tight or prolonged. The splints were removed at the usual time and massage and passive motion started. The slow onset of edema and pain, the spindle-shaped swelling of each individual finger joint, the inability to make a fist, the sleepless nights, the bitter complaint of the ineffectiveness of treatment, the tendency of the inflammation to increase to a certain climax and then more slowly subside leaving a crippled hand all formed a clinical group of symptoms exactly as in the first list reported. It is only necessary to refer to the anxieties of the patient or of the surgeon to the possibilities of a malpractice suit or to the probability of a more or less crippled hand to make a surgeon recognize the importance of the condition when once established.

In studying these cases the following facts are evident. The arthritis is not due to tight splinting as shown by the statements of patient and attendant. The course of the fracture is normal and the swelling begins shortly before or after removing the splints for good. It is not a neuritis as there are no tender nerves, no true paralysis and no numbness except such as follows edema. Tuberculosis, gonorrhoea and rheumatism are easily excluded. The clinical picture is so striking and so unlike other conditions that the diagnosis is such a easy. It can only be stated that it must be of the nature of a traumatic arthritis following as a late complication of fractures or injuries of the upper extremity especially Colles' fracture.

In several patients there was some involvement of the elbow joint. In some there were adhesions that were formed along the extensor and flexor tendon. In one there was noted a slight Dupuytren's contraction of the palmar fascia. In the previous article there

were quotations about the connection between arteriosclerosis and traumatic arthritis which will not be repeated here

As regard the treatment the writer has formulated the following In the first place I inform the patient and the physician who cared for the fracture that the arthritis is not exceptional and that no one is to blame that the hand will get worse before it begins to get better that until pain and swelling begin to subside a light splint is needed for protection sedatives are needed for sleep and that as local treatment hot air baking



Fig 2 On year after arthritis, showing crepitation and swelling

and gentle massage may be used daily As pain and other drugs may be tried but are of little use Later Swedish massage and motions hot air baking local and general stimulant treatment such as vibration light electricity and the use of the hand If in due time there is much stiffness forcible motion under gas is permissible but if too violent this causes a reaction which retards recovery

The prognosis should be guarded Six months to two years elapse before recovery In these ten cases four may be said to have regained a normal hand Two are still convalescing Three were permanently crippled and one died of cardiac complications



Fig 1 Case 4 Six weeks after fracture showing bony ankylosis

two months after the fracture with the hand still swollen stiff and extremely tender and painful

In reporting the cases two X rays only are repeated in this article because they show simply a general bone atrophy The cuts indicate the appearance of the hands

CASE HISTORIES

CASE (Author's own case) Woman aged 55 housewife Previous and present history good On June 20 1909 she fell and sustained a Colles fracture of the right wrist Very little force straightened the wrist and two wood splints were applied After the first day there was no pain or unusual signs The X ray showed simply a transverse crack Free motion of fingers At the end of the third



Fig 3 Case 5 Eight weeks after fracture just after acute stage some edema Regaining atrophy



Fig 4 Case 8 Ten week after fracture Attempt is being made to flex fingers



Fig 5 Case 9 5 weeks after fracture arthritis at the elbow

week complaint was made of aching in the wrist and hand. The dressings were removed as had been done before some edema was found and massage given. As the symptoms increased the splints were replaced by an adhesive strap and a wet dressing applied of aluminum acetate. At that time there was a diffuse edema up to the elbow with spindle shaped swelling of the finger joints. All motions limited and painful. There was no paralysis or anesthesia but numbness of the skin, weakness and atrophy of the muscles. Hot air bakings and massage were given. Nine weeks after receiving the fracture as the symptoms had improved a little the patient was given gas and the joints moved with moderate force. Many adhesions were broken in the joints. Great swelling and pain ensued. One month later the stretching was repeated with better results. July 4, 1910 almost one year after the fracture a X-ray was made and the hand (see Fig 1) photographed. There was one half inch atrophy of the forearm and atrophy of the interosseus. The skin was glossy and atrophic. Sensation was good and power fair. Limitation of motion was the chief sign. She was unable to make a fist and the wrist motions were not normal. Since then there has been little gain.

CASE 3 Woman aged 35 salesgirl. About five years ago she had had aching and pain throughout the left arm for some months. The diagnosis was rheumatic neuritis and recovery was complete after treatment. On April 30, 1909 she fell and broke the left wrist. Dr. Heidegger reduced it and applied a posterior splint with adhesive. The next day the writer made a X-ray and found a transverse crack in the radius with no deformity. Motion and massage were given later. At the end of the fourth week the splint was removed and free use allowed. One week later the hand and wrist

began to swell and stiffen. Some redness appeared next day and the finger joints became spindle shaped. On June 10 another X-ray was taken but except for some general atrophy of the bone this picture was identical with the first. Local treatments and antirheumatic remedies were ordered. Two weeks later in consultation it was pronounced subacute inflammatory rheumatism although the arthritis was confined to the one hand. Three weeks later another consultation suggested tuberculosis. By September 5 there was general improvement. Motion at the wrist was 80 per cent of normal. Six months later the skin was still atrophic and shiny, the muscles small, the grip poor. Six months later the grip was weak but the color pink and normal. The thumb and wrist had entirely recovered. The most characteristic feature was that the finger tips could not be made to touch the palm although the middle and ring fingers came within one half inch of it. She has practically recovered the use of her hand.

CASE 3 Woman aged 55 housewife. Previous health good. On November 26, 1907 she fell on the sidewalk and hurt her right shoulder. Dr. Hays diagnosed fracture of the surgical neck of the humerus with some impaction. As it was impossible to adduct the arm he used some force to bring the arm to the side and applied a shoulder cap and a Velpeau bandage leaving the hand free. Later the X-ray confirmed the diagnosis and showed fairly good position of the fragments. The course was normal till the end of the fifth week, some time after the forearm had been released from the

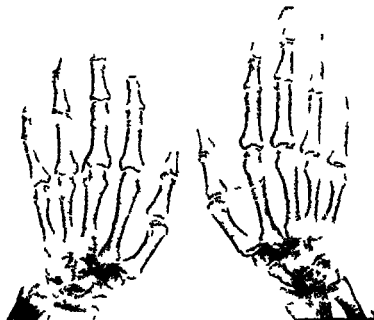


Fig 6 X ray

bandage. An inflammation began with swelling pain and numbness in the hand and forearm. This rapidly increased. An examination was made under chloroform and some slight force used to break up adhesions. The pain after this was terrific and continuous. The superficial oedema hard and the arm motionless to the elbow. Three weeks after the onset of the trouble Dr Hayd asked the writer to take charge of the case as he was going out of town. At that time the swelling and pain had begun to lessen. The scapula moved with the humerus and abduction was limited to ninety degrees. At the elbow there was good flexion but very limited extension. Pronation and supination were free. The wrist and fingers were very stiff and passive motion extremely painful. The treatments were hot air bakings, massage and faradism. Improvement was slow. Two and a half years later there was good use of the arm except for fine motions, e.g. buttoning her waist. At the shoulder external rotation and abduction were limited. The elbow full extension was impossible. Wrist free thumb, however, slight limitations. On attempted flexion of the fingers the fingertips approached within one inch of the palm.

CASE 4. Woman aged 49 referred by Dr Eugene Smith. Her sewing always in good health but her sister who had been badly crippled for the past year with some form of chronic joint trouble affected many joints. On February 12, 1911 she fell and sustained a Colles' fracture of the left wrist. An X-ray showed almost no displacement. Wooden splints were applied and the fingers allowed freedom of motion. At the end of two weeks the splints were

removed daily for passive motion. Some slight stiffness and puffiness noticed. After this there was a progressive onset of pain, stiffness, oedema and swelling of all the small joints of the hand (see Fig 2). The climax of pain was reached about six weeks after the fracture. The writer saw her March 31 and began to treat her. Since then there was slow improvement but at the end of six months a partial crippling remained. This case has been lost sight of.

CASE 5. Woman aged 69 referred by Dr Joseph Lewis. Housewife. In good health. Examined April 19, 1911. Eight weeks previously a fall resulted in a Colles' fracture of the right wrist. No X-ray. Easily reduced and treated by a plaster of Paris molded splint. At the beginning of the fifth week aching was noticed in the hand and fingers and stiffness of the small joints. There was a steady onset of severe pain and marked stiffness and trophic changes. Climate in the seventh week. Hand photographed at the end of the eighth week showing the condition after improvement had begun (see Fig 3). There followed slow gain and at the present time there is a practical cure.

CASE 6. Woman aged 55 single. A small frail woman with fairly marked arteriosclerosis. Examined February 5, 1911. Four months previously she had received a Colles' fracture of the left wrist which was reduced and treated by a plaster of Paris splint. This was removed at intervals for massage and inspection. During the latter part of this period she suffered greatly from pain and on removal of the splint found her hand quite stiff and swollen and the fingers unable to meet the palm. The



FIG. 1, 2

condition grew worse and another physician who was called in treated her by forced motion and local applications. As there was no improvement a friend asked her to see the writer who found rigidity of all the small joints of the hand. There were the usual atrophy of muscles atrophic appearance tenderness and clawlike hand. Motion under gravity was tried passive motion and baling but the hand remained permanently crippled. An X-ray showed a slight deformity of the wrist and much atrophy of bone. About a year later she died of some intercurrent trouble.

CASE 7 (Auth. rs. v. n. c. se.) Woman aged 70. Had enjoyed exceptional health for many years. January 6, 1914, she sent for the writer stating she had fallen the previous evening and hurt her left wrist. An X-ray disclosed a transverse crack of the radius without deformity. Wooden splints with adhesive were applied for three weeks. The course was normal till the third week when pain was complained of. On removing the dressing as had been done before the condition was recognized and a massage obtained to stimulate light massage and bakings. This case was the worst because there was no improvement till the time of her death about two months later when the hand was still swollen, glazed atrophic perfectly stiff and sensitive that even while in comfort the hand was moved there was a change in respiration and a reflex contraction of the muscles. Five weeks after the fracture she had a severe bronchitis and was sick for several days. Soon after getting about she fainted and Dr. Getman found a high blood pressure and a very weak irregular pulse. She was

put to bed and treated medically. She became weaker and more prostrate so that the treatment of the hand was stopped altogether. She then became maniacal and lapsed into coma which continued nearly a week before her death. It would seem that there was some connection between the arthritis and the affection of her circulatory system.

CASE 8 Woman, aged 77, referred by Dr. Rabinbach March 10, 1914. History good except that she had been troubled by constipation hemorrhoids, and soreness of the muscles that she called heumatism. Three months previously she had had fracture of the surgical neck of the left humerus with impaction. Considerable hematoma had formed from rupture of a vein. This swelling caused pressure of the brachial plexus. A light Velpert dressing was used at first but later the fracture was only used. The hematoma was absorbed and motion started the usual time. The swelling disappeared in the left hand began only at the beginning of the fifth week increased and remained at a climax for four weeks. There was extreme pain; somnolence on motion and swelling of distal joints. The cut (Fig. 4) shows the condition ten weeks after fracture when she was attempting to make a fist. The treatment as general plus body baths massage and baking. At the present time seven months after the fracture she has largely recovered and is still improving. The shoulder is excellent condition in fact while the hand was most swollen the shoulder had recovered enough for her to place the hand on top or behind her head.

CASE 9 Woman, aged 43, referred by Dr. Weil

September 5 1914 Housewife Ten years ago she had had a fall on the back which was followed by a partial paraplegia and partial loss of bladder control Complete recovery in three months Six weeks before examination by the writer she fell and hurt her right wrist Dr Weil had an X ray taken which showed linear fracture without displacement A plaster splint was used for four weeks The fingers were moved from the first and the splint removed once a week In the fifth week the hand which had been slightly swollen became inflamed and so painful on any motion that a light splint was again applied The cut (Fig 5) shows the condition in the sixth week The hand was hot and tender and each joint swollen All motions limited and painful and shoulder joint motion slightly restricted There was bitter complaint of the pain and insomnia Rapid improvement has taken place in this case due to body bakings

CASE 10 Man aged about 60 seen in the clinic of the University Hospital of Philadelphia in June 1914 This man among other patients was being shown by Dr T Turner Thomas as a case of previous shoulder dislocation The doctor stated that during convalescence the man had had an unusual trouble with the hand from which he had not recovered The writer called the patient to him and asked the man to make a fist He said he could not In fact he could not bring his finger tips with

in an inch of the palm The usual atrophic appearance stiff joints and pain on forced motion were present A subsequent conversation with Dr Thomas confirmed the diagnosis

NOTE—Since reading this article a physician gave the writer the following history of his own case which was one of arthritis of the joints of the fingers and wrist following six weeks after a Colles fracture The history differs in these particulars he was young at the time the deformity was imperfectly corrected after the interval of a week and the X ray now shows deformity and permanent joint changes Male aged 22 in good health Fell from a pony while playing polo fracturing the right clavicle and three ribs and receiving a Colles fracture of the right wrist When examined some hours later the swelling was so great at the wrist that no attempt at reduction was made One week later in New York a surgeon succeeded in a partial reduction with the aid of an anæsthetic After that the course was uneventful until the end of the sixth week when the splint was removed Then he began to suffer severe pain and all the joints of the hand and wrist swelled and remained so for three months There was great pain tenderness and pain on motion The attendant stated that it looked like an arthritis deformans In one year he recovered the use of the hand but the wrist has remained partially crippled

AN INTRAGASTRIC ADHESION

WITH THE REPORT OF A CASE

By C HUGH MCKENNA M.D. Chicago

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CONSIDERABLE progress has been made in the past few years in the interpretation of pathological lesions of the stomach and intestines by means of X ray pictures following bismuth or barium meal However I am of the opinion that in the hands of experienced surgeons this data in many instances is held in a skeptical way from a diagnostic point of view since so frequently at operation the finding apparently do not correspond with the reading from the X ray plates

I will briefly present a stomach case with the accompanying clinical data and an X ray picture which appears to be unique first because of the X ray shadow produced and second because of the findings at operation I believe in a measure this case explains our inability at times to perfectly

interpret X ray pictures I have chosen to call these lesions intragastric band or adhesions and this condition is beautifully demonstrated in the accompanying picture (Fig 1)

At operation an indurated saddle ulcer with the base about the size of a quarter of a dollar was found in the cardiac portion of the lesser curvature of the stomach contrary to what we expected to find in this case which was an atypical hour glass stomach The stomach showed only slight contraction at this point but the condition in no way gave the appearance of marked constriction shown in the accompanying plate The ulcer was reflected by means of a diamond shaped incision and adherent to its floor was a tongue shaped band of mucous membrane from the opposite side of the stomach wall



Fig 1

the greater curvature. This condition appears to have been brought about by a contact ulcer. Evidently the mucous tongue had stretched without drawing the muscular and serous coats with it.

In this instance the X-ray picture gave a true shadow of the pathological condition but would have been impossible of correct interpretation had not the stomach been opened. Had there not been a suspicion of malignancy about the lesion it might very properly (owing to its location) have been left intact and the case turned over for medical treatment.

In a relatively large experience in gastric surgery I am of the opinion that if it be possible and proper to examine the interior of the stomach wall surgeons will find a gradually decreasing number of cases where the X-ray findings and the lesions at operation are at variance.

CASE Miss J J. Present complaint First attack 51 years ago. Following a dinner party put on



Fig 2

was taken with a severe spell of nausea and vomiting and severe gripping pain in the epigastrium. She fainted during this spell. She fasted for several months during which time she had very few vomiting spells but severe cutting and gripping pains in epigastrium. This pain seemed to come on about an hour and a half after eating. Eating would relieve the pain for a short time. Soda also would relieve the pain. The pain was often so severe that the patient doubled up like a jack-knife. This pain was most severe below the xiphoid and slightly to the left side. It remained rather localized. Patient never noticed blood in the vomitus nor did she notice food eaten the night before in the morning vomitus. After vomiting she felt relieved. She has lost much weight. Late she thinks about 30 pounds in last two months. Patient ailed for two years following the first attack six years ago. This last attack is of six weeks duration. It is similar to the one described above. More vomiting in this attack than in the other. No blood in vomitus.

Past history Diphtheria two times. Pneumonia 4 years. Family history negative. Habits Tea and coffee not at all. Milk a great deal. Generally good. Appetite good. Bowels sluggish. Examination Head negative. Chest negative.

THROMBOSIS AND EMBOLISM¹

BY AUGUS McLEAN, M.D. DETROIT

A CONDITION which has been before the medical profession for many years especially since the inception of modern surgery and modern surgical technique — a condition which is becoming more frequent with the ever increasing number of abdominal and pelvic operations — a condition about which much has been written but concerning which little is known definitely is the subject I wish to bring to the attention of this society this evening

Several etiological factors are usually given as necessary for the formation of a thrombus (1) trauma especially injury to the endothelial lining (2) stagnation or slowing of the blood stream (3) chemical changes in the blood itself and (4) infection Regarding these causes it is hardly necessary to say that not one is alone sufficient to produce a thrombus When a thrombus does occur it is usually due to various combinations of these causes acting together Again thrombosis often occurs as for instance a femoral thrombosis following an apparently surgically clean appendectomy when as far as we can ascertain each one of these factors is wanting We are therefore forced to look for some other etiologic factor in such cases With the hope of finding some explanation for the thrombotic process in these cases we undertook some experiments on dogs

EXPERIMENTAL WORK²

Experimentally thrombosis is a difficult subject to work with first because of the difficulties that confront us in blood vessel surgery generally and in the post mortem findings in particular (as for instance locating the point of lodgment of an embolus) and second because the conditions under which thrombosis and embolus occur in the human being are difficult to imitate simply because no one single definite etiologic factor is generally accepted

In our experiments we were much impressed

Experiments performed under ether narcosis

with the tremendous amount of injury a vein can withstand without the production of a thrombus at the site of injury Indeed it is quite a difficult problem to produce a thrombus experimentally In daily surgical work all of us avoid injuring blood vessels as much as possible we always fear the possibility of causing the development of a thrombus

In our study we noticed several interesting phenomena namely

1 When a vein is ligated in continuity the blood in the vein will clot only on one side of the point of ligation that is the side from which the blood is coming

2 In ligating a vein between two ligatures (say two inches apart) the blood between the ligatures clots very slowly and if left for a week or more the contents of the ligated vein will have entirely disappeared a fibrous cord like structure alone remaining

3 The same result is accomplished by ligating an artery between two ligatures

4 Simple crushing of a vein will not cause a clot at the point of crushing The crushing can be repeated in forty eight hours and a clot will not form at the site Examination of the repeatedly crushed vein two weeks after the last crushing will show a thickening of all the coats of the vein due to an increased amount of fibrous tissue the intima remaining as smooth and glistening as before

5 Crushing of a vein with the subsequent introduction of a twenty four hour bouillon culture of staphylococci and again crushing the vein to grind (as it were) the staphylococci into the walls of the vein will not produce a clot or thrombus at the site of the crushing and injection of the staphylococci

6 The introduction of a sterile thread into the lumen of a vein allowing about one-half to three-quarters of an inch to remain suspended inside of the vein that is, oscillating in the blood stream failed to produce a clot or thrombus either at the point of the introduction of the thread or around the thread itself (see Fig 1)

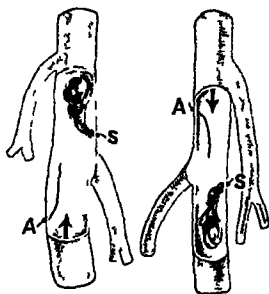


Fig. 1. At left: Section of artery with sterile thread (A) and septic thread (S). Thrombus present around septic thread. Fig. 2. Section of vein with sterile thread (A) and septic thread (S). Thrombus present around septic thread.

7 A sterile thread introduced into the artery in the same way and allowed to remain there for four, five and seven days will not cause the formation of a clot on the thread itself nor upon the wall of the artery at the point the thread was introduced (see Fig. 2).

8 The introduction into a vein of a thread infected with *Staphylococcus albus* or *aureus* will in three or four days cause the formation of a thrombus at the point of the introduction of the infected thread. The thrombus becomes attached to the vein at the point where the infected thread enters. It will not entirely occlude the lumen of the vein; it will grow or enlarge in the direction of the blood stream remaining suspended at a single point (see Fig. 1).

9 A thread infected either with the colon bacillus or with the *Staphylococcus aureus* introduced into an artery causes the formation of a firm clot as proved by post mortem findings five days after the introduction of the thread (see Fig. 2).

10 Sterile threads one half inch long let go in the circulation caused no symptoms up to the present writing (7 weeks).

11 An infected thread (colon bacillus) one inch long let go in the circulation caused a sudden death in 3½ days. Post mortem examination showed a seropurulent fluid in the pleural cavity and the embolus (thread with blood clot infected with colon bacillus around it) was found in right lung (see Fig. 3).

On examination of an induced thrombus of this kind it can readily be seen how easily such a thrombus could be torn from its small firm attachment, circulate in the blood stream and become lodged somewhere in the pulmonary circulation and perhaps produce a fatal termination just as happened in experiment noted in paragraph 11 above.

It is difficult to conceive a condition in a patient similar to the one in which we were able to produce a thrombus in the dog but the difficulty found in producing a thrombus experimentally shows that there must be factor other than injury to the vessel lining of the blood stream and chemical changes that bring about a thrombotic process in human beings. We believe infection or necrosis or both are quite essential. Whether the infection *per se* is the etiologic factor or whether the toxins derived from the infectious or necrotic material are the real agents we do not know. Whether these substances cause first a hemolysis, a conglutination of the platelets and red corpuscles—a view usually held in regard to the method of thrombus formation—or whether these are substances akin to fibrinogen and thus directly cause the coagulation of blood in the vessel also is not known. Is it perhaps possible when thrombosis occurs after an apparently surgically clean operation that during the operation certain ligatures have been placed in such a way as entirely to cut off the blood supply to certain areas which contain a low grade infection and subsequently become necrotic and liberate the substances necessary to complete the coagulation of blood in the surrounding vessels?

RELATION OF THROMBOSIS AND EMBOLISM TO OPERATION

In looking up the statistics we find that thrombosis and embolism follow operation for large pelvic tumors more frequently than

by other operations. Of forty eight reported cases collected by Schenck 58 per cent followed operations for the removal of large pelvic tumors. Schenck also shows that in 1904 myoma operations from twelve different clinics namely those of Goldman, Burnham, Enczel, Duvergey, Hofmeier, Klein, Zurhille and Kelly, ninety six or 3 per cent were followed by thrombosis. My own record of the last two years shows that in 1610 laparotomies there were 33 cases or about 2.2 per cent that were followed by thrombosis or embolism. There were nine cases of fatal embolism, three cases of pulmonary embolus in which the patients recovered without further trouble, two cases of pulmonary embolus followed by lung abscess with recovery, 2 cases of embolus of the liver followed by hepatic abscesses with one recovery, and two cases of cerebral embolus followed by death. Besides these cases of emboli there were fifteen cases of femoral thrombosis, all of which followed pelvic operations. Of the eighteen cases of embolism, eight or 44.4 per cent followed prostatectomies and hysterectomies. The striking thing in all cases of embolism and thrombosis in our series is that there was only one case of embolism with recovery and no cases at all of thrombosis that followed operations in the upper abdomen. This one case followed an operation for suppurative gall bladder disease. In the cases that are most frequently followed by thrombosis and embolism there is always a certain amount of pressure exerted on surrounding structures. The circulation, especially the venous circulation, is retarded and extensive varicosities are quite common. There is also ample opportunity in these cases for remnants of tissue remaining either in the form of devitalized pedicles or as in the case of a prostatectomy, hundreds of connective tissue which subsequently become necrotic perhaps harbor a low grade infection and give off the substances necessary for the development of a thrombus.

Perhaps the most striking proof of the theory that necrotic tissue plus a non virulent infection does cause thrombosis is presented in those cases of pyosalpinx in which the whole fallopian tube is adherent and necrotic and can be removed entirely without ligating

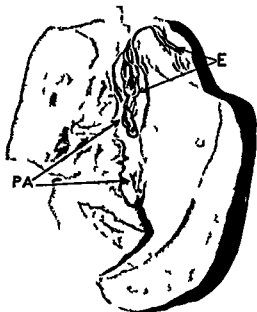


Fig 3. Section of leg. PA pulmonary artery. E open showing closed embolus. F embolus around infected thread carried from femoral vein.

a single vessel. Similarly a necrotic appendix can be removed without ligating the appendicular artery. Here ligation is not necessary because all the veins and arteries are already thrombosed from being in proximity to the necrotic tissue. The bleeding that does occur in these cases is simply an oozing from the newly formed capillaries that have developed in the adhesion.

We know that thrombosis is more apt to follow septic cases than aseptic ones. In these cases the infection that is contributory to the thrombus formation is quite evident. Coincident with the infection there is always an inflammation and in the first stages of inflammation a slowing of the blood stream is noticeable. It would indeed be surprising if evident septic cases did not furnish the greatest percentage of post operative thrombosis for here are present in a marked degree the two factors upon which thrombosis mainly depends.

Thrombosis and its consequent embolism rarely occurs before the eighth day. The usual time is from the eighth to the twenty first day. Recently a case came to my notice



Fig. 4. Section of femoral vein, showing the thrombus. PA, posterior; E, external; T, thrombus.

in which a fatal embolism occurs in a life as two months after an operation for a uterine myoma. It is a rather slow process, but complete necrosis of the tissue on which the embolus depends to a great extent is not a rapid process. It usually takes a week or ten days at about the length of time in which the thrombus usually appears. The thrombus that forms during this time may remain undisturbed almost indefinitely, or the other hand at almost any time it may become dislodged wholly or in part and give rise to an embolus. This explains why the time of the appearance of a thrombus is earlier and more constant as compared to the life and quite uncertain appearance of an embolus.

The great majority of operative thromboses, except perhaps those which occur after mastoidectomy disease, and those which occur in the internal jugular vein, are found in the long saphenous femoral or femoral vein. In discussing the cause for the comparative frequency of femoral and iliac thrombosis is Clark, under the conclusion that it is due to the effect of traumatic exertion on the deep epigastric vein. The primary thrombosis originates in the deep epigastric vein and slowly propagates along the line of the vein until it reaches the external iliac vein where it gives rise to retro-

gressive thrombosis in the femoral vein. The long interval between the operation and the appearance of the femoral thrombus suggests a slow process, starting some distance away. It can be seen how a thrombus once established in the deep epigastric vein can be propagated to the femoral vein but that implanting a thrombus in the deep epigastric vein seems rather improbable on the ground that the most severe injury can be inflicted on a vein without causing a thrombus. Besides this the thrombus occurs not infrequently in the site opposite the one in which the traumatic wound on the deep epigastric vein.

Again the valve of vein, an often alluded to a predisposing to thrombus formation but clinically thrombi are found in locations where anatomically valves are absent as for instance the lumbal sinuses.

In our case of postoperative thrombosis in the long saphenous vein occurred relatively quite frequently yet never did an embolus result from a thrombus in this location. Probably the anatomy of this vein explains why embolism did not follow its thrombotic condition. First it is placed deep in the superficial fascia and does not receive the constant and repeated impulse

of an accompanying artery as do the femoral and iliac veins consequently it is comparatively easy to keep this vein at absolute rest. Second three veins the superficial epigastric the superior external pubic and the superficial external iliac enter either at right angles or even at acute angles against the current of blood and consequently cause a peculiar swirling of the blood stream at the points of their entrance which tends to prevent the passage of any solid material.

Can the formation of thrombosis and subsequent embolism be prevented? As long as we are unable to say exactly on what factors thrombosis depends so long shall we be unable to say definitely whether or not we can prevent its formation. The probable causes as they present themselves today should of course be avoided. It is not possible to do this at all times. We cannot always avoid necrosis of tissue nor can we always avoid infection for infections are often present before the case comes to the surgeon in fact they are very often the condition for which a patient seeks relief. Once a thrombus has formed however we can to a large extent avoid the occurrence of an embolus. The limb should be elevated to encourage the venous circulation wrapped in cotton and surrounded with hot water bags. Some advocate ligation of the vein proximal to the thrombus but this we believe impractical in most cases and of doubtful benefit. Absolute rest must however be insisted on as a precaution against secondary embolism. The rest must be kept up until the clot has had a chance to become thoroughly organized a process which will usually take from three to four weeks. If after the lapse of this time the patient is fortunate enough to have escaped the formation of a fatal pulmonary embolus from his thrombus if he has escaped the long and tedious invalidism consequent on the lodgment of an embolus in his liver or else where his subjective suffering and discomfort is not at an end. Thayer examined a

number of cases of post-operative venous thrombosis several years after their occurrence and found that when the femoral and iliac veins were involved the afflicted extremity was usually considerably and permanently enlarged. It presented varices often terminating in ulceration in addition there was marked weakness and cramps especially at night and on overexertion. Schenck was able to gather the late histories (that is four years old) of twenty nine patients in the forty-eight cases in the Johns Hopkins series. Eight of them had symptoms for about four months and subsequently no trouble. Two had some difficulty in walking for about twelve months. Nineteen never fully recovered being troubled with swelling and with more or less pain. On this basis he concludes that it is fair to assume that about 65 per cent of the patients never recover and that if complete restoration is to follow it will come before the end of the first year by which time the collateral circulation is as completely established as it ever will be.

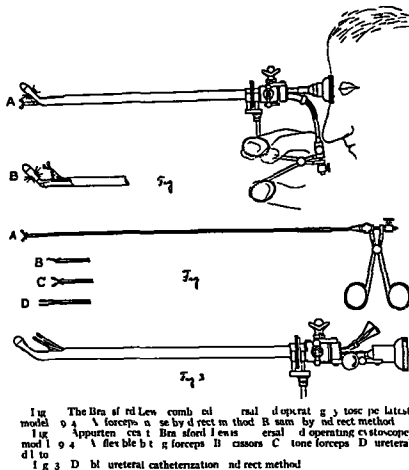
Some one has said that surgical morbidity does more to bring surgery into disrepute among the laity than surgical fatality. It is more lasting and it is continually and prominently before the people whereas fatality is soon forgotten. If this is so thrombosis and embolism more than any other condition should ever be in our minds as one of the possibilities that may put a practically indelible blot on even the most skillful surgery.

CONCLUSIONS

1 Endothelial damage on which so much stress is usually laid is not *per se* a cause of thrombosis.

2 Infection and necrosis or the toxins derived from an infectious and necrotic process are probably the most important factors in the production of a thrombus.

3 A slowing of the blood stream is a contributory cause but *per se* will not cause a thrombus to form.



Cystoscopic manipulations of various sorts have succeeded in removing ureteral stones in a very considerable number of cases (probably a hundred or more up to the present date). Successes have been reported by Howard Kelly (7) Braasch (8) Young (9) Kretsch (10) Ashcraft (11) Moschowitz (12) Casper Schmidt Robert Bryan (13) Harvey Moore (14) Perrier (15) myself (16) and others.

A formulated plan together with instrumental equipment was submitted by the writer and its use was reported on at the Cincinnati meeting of the Mississippi Valley Medical Association in 1904 and further discussion of the method was presented (16 b) before the American Urological Association in 1912.

This plan and equipment have been amplified and improved since their original presentation but there has been no cause for regret in any instance in which it has been adopted. On the contrary in the cases in which it has proved

successful the patients have expressed their gratification and intense appreciation of the simplicity and innocuousness of the procedure which had not menaced life or put them to serious inconvenience while in cases of failure it has left the patients in no worse condition for the open operation than they would have been with out it.

The writer would not like to be understood as making immoderate claims of unvarying success of the method. With certain cases it is feasible with others it is not. Judgment and accurate diagnosis must be applied to determine the probabilities in a given case. But in numerous cases in which there is room for doubt as to the outcome the patient should be given the benefit of this doubt. The less radical procedure should at least be given a trial before subjecting him to one that possesses elements of risk not considerable.

The cystoscopic maneuvers that have been

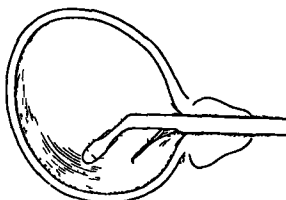


Fig 4 Indirect method of ureteral catheterization

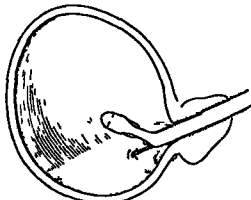


Fig 5 Direct method of ureteral catheterization

reported as giving success in the removal of calculi have been mainly two. The injection of oil through a ureteral catheter with the object of promoting the descent of the stone and the teasing of a stone out of its niche with a catheter when hung in the ureteral orifice. While these measures are commendable and often successful they are inadequate in many cases, and the more aggressive measures permitted by the operating cystoscope and apparatuses should give much greater efficiency and reliability.

Gratifying results were obtained with the

From the 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 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tion while the operator is at work has been maintained in the present model. The hafts of the accessory instruments are now made flexible to permit of their use at an angle (around the corner) (B Fig 1) as well as by the direct method (A Fig 1). This also permits the instruments (forceps, etc.) to thread the curves of the ureter to a much greater distance than the straight instruments with fixed hafts.

If constrictions are located high up in the ureter and beyond the reach of the metal accessories, reliance may then be had on flexible dilating bougies or catheters (Fig 2) for widening the tract and paving the way to dislodgment and descent of the stone.

The following case reports will illustrate some interesting experiences in this work.

CASE 1. Stone symptom nine months; cystoscopic manipulation; descent of stone shown by X-ray recovery.
CHARLES M— age 41. Last St. Louis, Illinois. Symptoms began nine months ago attacks of renal colic recurring every two or three weeks at that time, requiring the liberal use of morphine hypodermically. Catheter and X-ray showed no shadow about the rest of the right ilium. On July 7 observation showed tone merging from the orifice with right ureter. Attempts to grasp pushed forth but the orifice was dilated. On looking to the bladder extended it was once seen that the orifice was enlarged. The base of the bladder it pushed up and removed the alligator forceps. The catheter passed easily then into the pelvis of the kidney. At this time there were no more symptoms—the first relief for nine months. The stone as recovered did show here.

CASE 2. Symptoms thirteen months; open operation; removal of one stone; cystoscopic removal of another from the same ureter.

J. S. I— age 44. Remains of the left compound April 1914. Symptoms of recurrent renal colic for past thirteen months. Diagnosis of right renal tone was made. Year ago by physician who said the patient he could do so in a little time. The patient not being successful the patient came to me. Year later by ureter catheterization and X-ray a tone was demonstrated to be the right ureter about three inches below the lower end (Fig 8). Dilatations and on injections of fluid to bring this down it was removed by open operation on April 8, 1914. Recovery and closure of the wound followed satisfactorily. A month later sudden lesion of temperature led to the use of the cystoscope and lateral catheter and it was discovered that another tone existed in the right ureter half inch below the orifice plainly evident to X-ray and contact with the catheter. With the operating cystoscope the orifice was incised with urethral scissors. This was followed on the same night by the passage of good sized stone (Fig 9) and permanent relief from further symptoms. The stone was recovered and is in the collection shown (Fig 10).

CASE 3. Symptoms ten months; cystoscopic measures recovery.

T. A. M— age 54. Last St. Louis, Missouri. December 9. History of ten months duration severe attack of pain left lateral region then requiring the use of morphine hypodermically. Yet in the next three days not recurring about once a week. The end had difficulty

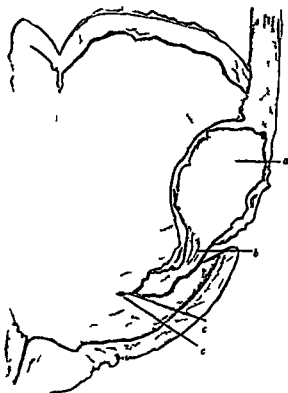


Fig. 8. Pathological specimen showing intubated ureter. Dilated left ureter. Drawing of the minute structured orifice.

in holding him, bed on account of the severity of the pain. While the left lateral orifice was visible through the cystoscope a catheter or bougie was obstructed about three-fourths of an inch from the opening. X-ray (Carmichael) showed shadow at this location. Operating cystoscope was then used the dilator entering by a short distance where it seemed obstructed. Dilatation was essayed but could not be executed to adequate distance. The opening had been enlarged with urethral dilators. Dilatation was effected and a retractor was used to aid in the following. The dilator was then used to pass a ureteral stone and complete relief from pain. Dilatation was thus there was no obstruction to the passage of catheters past the ureter. The stone included in the collection.

CASE 4. Ten months of symptoms; cystoscopic measures recovery.

A. DeL— age 38. American salesman St. Louis. June 7, 1913. Attack of renal colic began ten months ago the first on compound with oppression of urine lasting a day. Cystoscopy. Right ureteral orifice healthy left congested and inflamed bladder. Catheter obstructed three-fourths of an inch within the ureter. After using the retractor dilator the orifice dilated. Solution was injected to the retractor through the catheter and the patient was sent to the hospital. Within three hours returned a ureteral tone was passed and recovered.



Fig. 9. Cystoscopic view of strictured ureteral orifice (1 ft).



Fig. 10. Diagram of sound passing through strictured ureter.



Fig. 11. Metal dilator passing through strictured ureteral orifice.

by the patient. Complete relief. Stone included in the collection.

CASE 5. Recovery after cystoscopic measures, following two years of recurrent ureteral colic of severe degree (bilateral).

History. Butler, Pennsylvania, is a 50-year-old male. Patient first began having renal colic 12 years ago but they have been especially severe during the past few months. Pain most intense in lower lateral region of the back, recently in the lower not standing morpho coincident reaction of both testes. Urine bloody. Lacerated sensation of the post-urethra bladder on attempts at instrumentation. Obstruction to both lateral catheters on left side to one-half inch. X-ray shadows at corresponding distances on both sides. Several cystoscopies were done the following month attended with dilatations of both lateral orifices. Attempts at grasping stones and injection of oil failed. While successful in grasping the stones the patient passed three small calibers at a time. Following this he was required to use a Foley catheter. The finding of these as preceded by marked alleviation of the lateral pain and improvement in the local condition of irritation and urgent frequency etc. And on the following lateral catheters (tonic) (ureter) both catheters passed easily to the renal pelvis. Relief from former symptoms was complete and permanent as indicated by letters from the patient received a year later.

CASE 6. Bilateral calculi symptoms fifteen years relief after cystoscopic measures.

History. S. H., age 43, Sherman, Texas, attorney. Arrived October 20, 1905. Original attacks of renal colic began fifteen years ago, recurrent at frequent intervals. In January of the present year since which time they have been much more frequent and severe. Sharp lancinating pain extending down the left ureteral region into the bladder and left testis, often causing the latter organ to inflame and swell (epididymitis). Large amount of emphysema of the left flank of two weeks ago which was attended with chill and temperature of 35.5° F. Examination. Urethra hypersensitive, bleeding even after the use of a soft rubber catheter. Cystoscopy both lateral catheters were obstructed, left to one inch and right to three-fourth inch. Ureteral dilator was used both sides followed by the injection of boric acid solution. Repetitions of the alkalies. Repetitions of the above measures on October 30 and November 6 and 11 attempts at lateral catheters were blocked. On November 11 the patient passed three small calibers at a time. Following this the patient felt relief of renal colic several hours duration and finally sudden relief, though something had passed into the bladder from the right ureter. Following this there was more than usual bladder irritation, although it was something passed from the bladder included blood clot. This was suddenly thrown out by the ureter. But the indication that the stone had passed from the right side was confirmed by the easy passing without obstruction of ureteral



Fig. 12. Metal dilator distending strictured ureteral orifice.



Fig. 13. Ureteral scissors engaged in strictured ureteral orifice.



Fig. 14. Effect of cutting with ureteral scissors.

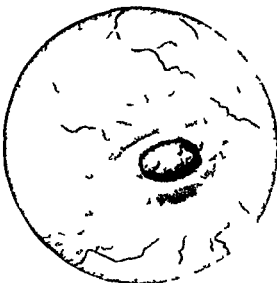


Fig 15 Stone impacted in left ureteral orifice



Fig 16 Removal of stone shown in Fig 15

catheter November 4 to the kidney pelvis on the right side and the absence of the X-ray shadow on that side thereafter. No colic occurred after this. The patient felt such relief that he did not wait the clearing up of the question regarding the other ureter but went home under the promise to return. This case troubled him further. Letters from him received during the next several years indicated his continued relief from colics and urinary irritation and his enduring health.

CASE 7 Ureteral stricture and stone recovery twice after cystoscopic measures.

I R.—age 36 married. J. H. Hew. J.uary 26 19 History of ureteral colics last ten months accompanied by bloody urine. Previous to that patient had lam back for years. Urine clear but blood cells microscopically. Urethra tight and hypersensitive to instrument. Cystoscopy February 4, 1911 showed a tight stricture at the lower end of the ureter, successful dilation of the lower end of the ureter, successful dilation of the ureteral bougies Nos 4 to 7 used February 5 repeated. Much relief in pain and frequency of urination and other evidence of irritation. No more trouble for ten years, when he returned (April 9, 1913) complaining of pain in the region of the left ureter severe attack having begun at 3 o'clock on the previous morning. The patient was sent to St. John's Hospital where on the same afternoon the metal ureteral dilator was used stretching the left orifice vigorously. Within two hours thereafter the patient passed small stone. Complete relief came coincidentally.

CASE 8 Prodromal symptom 12 years existing attack nine months (continuous pain) cystoscopic immediate removal permanent recovery.

D. W. L. G.—age 60 physician. Paul Baylen. Referred October 9, 1908 by Drs. Hold and Crisler of Memphis. First renal-ureteral colic ten years ago occasional attack since. Present attack began nine months ago and pain has been continuous since. Often the pain in the lower left ureter was so severe to require the use of morphine. Cystoscopy showed small black pig-like left ureteral orifice. It was exhibited to several physicians and assistant before any measures

were undertaken. Then with the operating cystoscope in place an alligator forceps was inserted into the orifice and opened stretching it widely. Immediately there was a spout of pus and urine from the orifice, including with it the black pig-like which proved to be a dark colored uric acid stone with several small spicules that evidently had become fixed to the ureteral wall and therefore had been prevented from escaping previously. The patient at once remarked that the first time he had been free from the pain in nine months. The stone was, of course, easily removed from the bladder and the patient was at once well and has had no recurrence of the trouble.

CASE 9 Symptom eight months cystoscopic measures recovery in five days.

R. B. W.—age 30 American. March 3, 1913. History of recurrent renal colics for eight to ten months some attack exceedingly severe. Cystoscopy and X-ray showed obstruction of the left ureter low down (about two inches below the orifice) and also on the right side about the same distance both shadows apparently in contact with the catheters. Argyrol solution was injected; connection with the catheter manipulations, and the patient



Fig 17 Forceps grasping stone in lower ureter

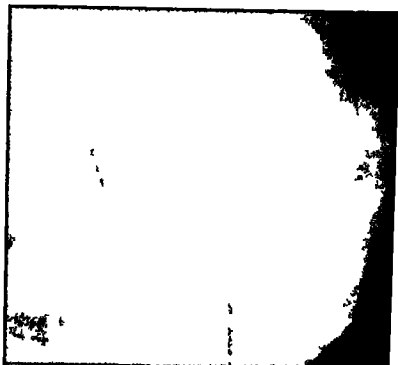


Fig 18 Stone about three inches from lower end of right ureter catheter
A ureter B force manipulation

left the city for a few days. Within a week he passed large mixed material, tone relief following and lastly to the present time. He has not returned since.

CASE 1: Ureteral colic relief through cystoscopy means. Recurrence years later, cystoscopy manipulations and escape of stone through abnormal opening in ureter wall recovery.

T. J. S.—age 43, son of an Illinois merchant. On February 5, 1903, was suddenly stricken with severe colicky pain in the left lumbar region running downward along the course of the ureter into the testis. Morphine half grain doses gave only partial relief. On February 9, cystoscopy and ureteral catheterization were followed by forcible injection of antiseptic solution into the left ureter. On the following day four little pieces of stone were passed voluntarily by the patient and slight gauze trainer relief from pain was coincident.

Nearly a year later (December 1903) he experienced recurrence of the colic but did not consult me for two months, during which time there was a persistence of pain. When there was obstruction to the passage of the catheter in the left ureter it took two and a half inches above the outlet. Injection of glycol solution repeated two days later but this time it was noted that the obstruction was much lower than the previous catheterization. The metal dilator was then used straight through the orifice while the instrument was being withdrawn. It was done under direct observation and occasioned nothing of moment at the time. Although the patient was instructed to use the gauze trainer all subsequent attacks have led to do this, so that there are no incidents

the movement of the bowel. Between times he noted relief from the colics and pain and when the next cystoscopy was done it was noted that the opening existed in the lumen of the left ureter instead of the normal one. The extra one was located on half an inch external to the normal left orifice. A forceps or dilator passed to the normal opening emerged through the anomalous one showing the communication with the ureteral channel. By continuing to pass the opening the catheter ascended without obstruction to the renal pelvis, showing the clearing of the channel of all obstructing factors. The pain gone and did not recur. The condition was obvious. The stone had descended into the terminal portion of the ureter where it had ulcerated its way through the wall to the bladder, hence it passed out untroubled. No bad after-effects were observed resulting from the unusual opening through the ureteral wall.

CASE 2: Renal colics sixteen years duration and extreme severity relieved by intra-ureteric manipulations. **A. C. W.**—age 50, lawyer. First conference September 3, 1903. The history consisted of renal colics with greatest suffering about repeated three times in the last of the year, requiring measures of the most heroic magnitude for even temporary relief. The patient, physician Dr. Hazeltin, assured me that he had often given the patient general anesthetics for four or five hours to relieve the pain. The ureteral catheter was obstructed two inches above the orifice on the right side at the precise location of the pain as described by the patient. It drew urine



Fig 9 Same Fig 8 after descent of stone one-half inch from orifice

that contained a definite amount of pus non-tuberculous. Injection of a septic solution was made to the ureter. On two successive occasions it really irritated the ureter. Cystoscopy was done and each time it was noticed that a normal opening existed in the right ureteral wall at a point one-half inch above the normal orifice (similar to the condition observed in Case 10). A catheter could be seen passing under the opening and its transit upward along the ureteral channel. Relief was so marked coincidentally that I interpreted the situation as relieved and the normal ureteral orifice as the avenue of escape for the stone. Preparations were made for the departure of the patient for home when he suddenly had a chill followed by a temperature of 103 and pain in the right lumbo-ureteral region. This so discouraged the patient that the open operation was decided on and carried out notwithstanding that the ureter, as then patent to the easy passage of catheter as attested in a cystoscopy. Dr. T. C. Witherspoon did the operation incising through the rectus muscle opening and searching both intra- and extra-peritoneally but failing to find evidence of calculus. The ureter was found enlarged and indurated from inflammation which doubtless was

the occasion of the exacerbation of the chill and fever that had precipitated the operation.

At any rate following this time the catheter ascended the ureter without obstruction and there was no more suffering from lateral colic or pain and the patient made a complete and permanent recovery in contradistinction to the previous sixteen years of agonizing attacks.

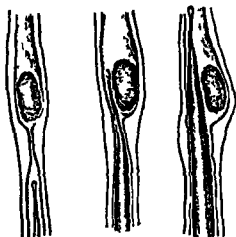


Fig 10 Manipulation of ureteral sound when at least two dilatations are located higher up the ureter



Fig 11 Stone of Case 11 removed Actual size

CASE 1. Ureteral symptom four years colics frequent a disease for 7 years prompt relief from cystoscopic measures

D. L. T.—a age 32 American 1 title Rock Arkansas February 8 913 W operated 1 May 19 and 73 gall stones were removed. Attack of renal colic began and has occurred from time to time since of the stand g the gall bladder operation. Attacks have been very severe for the past 3 years and have been more frequent latterly. March 6 914 cystoscopy ureteral catheterization, and X ray showed stone just below the crest of the right lumbar. Followed g d l i n g s and catheter manipulation. Liquid alboline was injected into the ureter well above the stone. This was repeated several times and three weeks from the beginning of them the ureter passed the catheter which was recovered and in how the accompanying collection of renal stones. Complete relief no recurrence.

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COMPLETE DISLOCATION OF THE INNER END OF THE CLAVICLE

By W. L. BROWN, M.D., and C. P. BROWN, M.D., EL PASO, TEXAS

A MAN age 33 was caught between a box car and a platform. His shoulders were forcibly crowded towards the center line and the inner end of the left clavicle dislocated anteriorly on to the front and upper part of the sternum filling up the supraclavicular notch. This deformity was much more marked than would have been anticipated unless one had examined the inner end of the clavicle and noticed its thickness. The dislocation could not be completely reduced and it goes without

saying that what reduction could be made would not remain.

An open operation was performed and a horseshoe flap was made over the sternoclavicular joint with base inward. After freeing the end of the clavicle it was found that the sternal part of the articular cartilage was partially dislocated and would push in ahead of the end of the clavicle when it was reduced. This was caught with forceps and held in place while the reduction was being made and it required all the force one



Fig. 1. Complete dislocation of inner end of left clavicle.

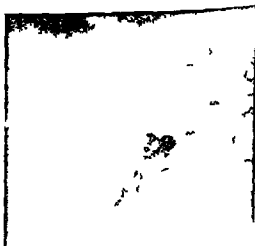


Fig. 2. Nailed and plated in place. Amount of force necessary to hold it surprisingly great.

could use with one hand and bone-holding forceps to maintain this reduction after it was made. This demonstrated the impossibility of maintaining reduction without firm mechanical support. The tendency was to spring forward and upward. A small drill hole was made through the end of the clavicle from above downward and inward into the sternum and through this was driven a four penny wire nail. This corrected the tendency to anterior displacement. It was readily seen that this would not

be sufficient to prevent upward displacement but for a short time and a light four hole vanadium steel plate was applied diagonally from the clavicle to the sternum the upper end being slightly hooked over the clavicle and four small screws were used. This effectually prevented the tendency to upward displacement this tendency being so great that it was deemed advisable to make section of the greater part of the sternomastoid muscle. Primary union and perfect anatomical result.

SURGICAL EXPERIENCES IN PUERPERAL SEPSIS¹

BY ARNOLD SCHWIZER, M.D. ST. PAUL, MINNESOTA

THE reason for choosing the subject of puerperal infection for my address before you gentlemen lies in the fact that it is of such great importance from the point of view not only of the obstetrician and the general practitioner but also of the serologist and the surgeon.

It would be impossible for me and of little interest to you to treat the subject to-night in a general and systematic way. I want to speak only of that phase of puerperal sepsis in which conservative means are no longer of any avail and where a surgical attempt becomes necessary. Since 1891 I have observed a small number of cases which chronologically arranged give a fairly good picture of a gradually increased aggressiveness and a gradual advance along surgical lines into this field. The fact that there are but nine cases in my series affords an opportunity of studying them somewhat in detail. It is of a certain value that the entire experience of one practice is thus portrayed instead of only a few select cases.

The general practitioner often considers puerperal fever too mystic an infection for him to grapple with. Unless the case is desperately rapidly developing secondary foci we are sure to have somewhere in the pelvis a rather localized process the treatment of which—let me say this right here—is not to be started with a so-called *thorough* palpation. The average gynecological examination is much too rough for these cases. If we consider that somewhere a breaking down thrombus produced the chill in our case and that this softened thrombus is being squeezed by our examination we ought to know that we must examine with the greatest gentleness and without producing pain. We must feel that in

these cases an *exact* palpation of the pelvis is more harmful than a laparotomy in competent hands.

We not only we the practitioners but also the writers of our textbooks labor too much under the awe of a systemic infection from the beginning. Of course we will usually find a bacteremia but in the acute and early stages of an osteomyelitis, or even of a phlegmon or a felon we have the same. It is hardly of any prognostic value in the early stages. If simple means, delicately applied are of no avail and if sera do not bring help if the case becomes the picture of outspoken puerperal sepsis then what? A further prolonged trial with laxatives, fomentations or ice and *Cridé's* saline—what do they do at this stage? Painfully little or nothing or harm. They let us lose valuable time. Instead of fighting with time-honored but inadequate weapons or of despairingly unloading all the burden upon the shoulders of the laboratory man with his vaccines and sera thus declaring surgery bankrupt we should look at the case clearly and courageously. Surely we do not want to interfere surgically unless our other means are powerless in bringing on a turn for the better within reasonable time. The strictest and closest observation is therefore necessary to decide when to wait no longer.

Somewhere there was a primary entrance and somewhere it spread mostly to a definite area. The virus has great tendency to reach the peritoneum either through the uterus or through the abdominal ends of the tubes. If this is kept in mind large doses of salts or other laxatives are dangerous. Still the free action of the bowels is everywhere demanded and laxatives are almost everywhere freely used. Somewhere there is a



FIG. 3. Case 8. Congenous placental area (teru)
Septic mit. P. rulent thrombophl. b. t. f. ght
ovarian nd teru

though the rarely the vagi l. c. on may suffice f
no second ry abscesses large thickent ss can be pal
pated aft th. u. tion One uch case we had
Mar h oop Th pat t ery large om as
referred t bo t three l. afte hldbirth Th re
w enorm bloating of the bdome O th d y
f admision Mch th t mprate re tood t o3
O the f llo i g d s t reached unil on Mch 6
n incised the culd sa fle h h the temperature
was normal nd the patient w d charged on Mch 1

Here the puerperal infection resolved itself in a
large single pelvic abscess, though the apper
ance of the patient the great soreness and pain
with the excessive bloating of the abdomen
presented a clinical picture causing great anxiety.

CASE 7. Mrs H. A. R. 26 years old sent to St
Joseph Hospital from the cou try on J ry 26 19
She had been del vered week previously nd promptly
fter that hrd high temperat re blo ted had abdominal
prun nd soreness On rival t St Joseph Hospt l
in the even g her t mprate re as 2/ pulse 60
he conditio looked grave There as ppare tly no
diffuse periton t T the right of th lll fge teru
swell g could be made out wh h was very sore W
decided to operat th t same evening A media ncision
was made Free seropus as f and the bdome The
right tube as edem t us nd thickened The right
ovary formed cystic tumor the size f range d
here t th lo er portion T mor d t be were re-
moved The teru was little l rge tha man fist

reddened doughy cedemat us Nex the right bore of
th ut rus tow rd the a terror suri ce there as bulk
ra sed f tuating are bout 1/2 t 3 cm diameter
Tha pened nd thick yello pus escaped from an
int am ral baseas A odol rm gauze dra as placed
t to th penu g The patient as put to bed and procto
clys t ried During the ght nd the ext morning the
pulse us 40 nd th t mprate re o3 but by evening
it cam down to 100/ with o3 pulse While the tem
perat re never re hed high degree, t more th
t eeks before t permanently isyed below 100/
Th was due partly t l ast to an bcess in the breast
which a lanced n February 6 after which the patient
wa ble t be out of bed She ent home in good con
ditio on February 23 four eeks fter entering the
hosptal Since the patient has had one miscarriage
she feels well

Perhaps the most interesting one of my cases
of puerperal infection was the following one

CASE 8 The patient farme wif 33 years old had
had 3 previous hldbirths On June 3 19 she had a
ery diffcult instrumental del ery nd ga e birth to
triplets The first one necessat ted forceps and lived
the second one brought to the orld three hours later
by pparately very d fult version as dead The third
ne also dead iken se del ered by emon Al
three chldre were l rge The place ta as scraped of its
lodge nder gre t difficulty The terus as irrigated
ft that with corrow s blm te sol tion The da
ft the d. l ery th temperature went p to o3 the
p le t 20 d her phys c n administered polyvalent
t treptococcus serum three t mes daily for five day
thout 3 benefit Light days ft her del ery she
as put on the trun and sent t St Joseph Hospital
Her t mprate re as / on her m l her pulse 40

For t pectio of the condit on he as talen to the
perat g room d by ery gentle palpating blunt
c rett g t as f and that there no retention of
pl ce ta or placental thrombi The uterus as irrigated
nd gauze trip satur ted th ca bol campho (car
bolu cid 3 per cent campho 60 per cent alcohol
pe cent) as sected The temperat re though still
3/ the next forenoon nder repeated irigation nd
renewed sction f odol rm gauze strips sat rated th
c bol campho became more reasonable so that from the
ft mnoon f Jun t ll early mornng of June 28 t
ranged from 00 t few times even traking the
09 max k in the mornng Neverth less by noon on
J ne 28 the temperat re p to 3/ nd on the next
day t as round o3 most of the time O Jun 30
he had hll la t g eight m uter nd the temperature
reached 5/ It became plain that re going t
love ou patient if nothing definite could be done Even
on Jun 7 t eek ft the del ery the fundus still
tood 8 cm bove the mympus nd only 4 cm below the
l The teru was bulky no defi te exudate could
be f t on palpation but the palpation had of course to
be very gentle W J dged that the placental l rea nd
the ut rus vere the m seat f the trouble the cuil
with la k of bulky exudat told us th t somewhere
broken down thrombus as t be reckoned th hile the
rather teddy high fever indicated t the same time con
t t lymphatic absorptio Th case looked desperate
and f we wa ted t k urgical tempt no time
could be lost It looked as though had ted too long
W decided to ope th bdome d case of exstave
findings to remo the large uterus nyway This as
don by med cison the forenoon of July The

uterus was very large doughy and reddened. From the somewhat diffusely thickened right broad ligament a hard chord which corresponded with the right ovarian vessels was felt running retroperitoneally over the line innominate, up to the kidney region. In the region of the linea innominata it had the thickness of the handle of an ordinary carpenter's hammer. It became less bulky further up. We removed the uterus with the adnexa usually and drained widely through Douglas pouch. Then we did something which I am not decided whether I shall do a next time or not as it seemed to be more traumatism than that at first appeared to be. Starting at the right edge of our abdominal incision we detached the peritoneum from the remainder of the abdominal wall until we were behind the ascending colon. Thus we reached the mentioned hard chord between us. It proved to be the thrombosed ovarian veins. The surrounding infiltrated rector tissue and the veins were opened as far up as possible. This was near the lower pole of the kidney where the veins are gathered to. No bleeding occurred. The ureters were not discernible. The patient's condition was no too good and it seemed unlikely to manipulate these purulent breasting down thrombi any further. A gauze drain was saturated with carbolic amorphous was put over the opened region and led through lumbar incision wound. The peritoneum was then closed. It fell back to place and the abdomen was closed. The operation had consumed about five minutes the pulse rate the operation was so and twelve hours after the operation had gone down with temperature of 100°/

The favorable outcome in this case proves that we need not feel as anxious to get in quick and get out quicker as we do in diffuse peritonitic conditions, but rather to consider the time of less importance holding foremost in our mind the duty of surveying all the pathology so as not to overlook abscesses or thrombosed vessels. This I consider an important point. With experience we shall not tackle entirely hopeless cases, but shall make it a point to go more fearlessly at a thorough investigation where the general condition is not too advanced. The thoroughness is more important and the patients stand a fair sized opening of the abdomen quite well. It is of course of utmost importance that we do not soil our wound and the peritoneum more than is absolutely necessary. This can be better accomplished by a sufficiently large incision. In closing such abdominal silk-worm is by far the best suture material. We avoid even fine catgut as much as possible. It makes too readily a culture medium.

Temperature returned to normal. The temperature rose again after the removal of the drain. On the day following the operation the temperature reached 100°/ and the next day not more than 100°/ but the woman was not troubled. On the evening of July 4 the temperature rose again. There was very little odor to the vaginal discharge. On July 5 considerable pus was felt in the right leg and the right groin the temperature dropped to 98°/ During the following days the condition remained during



Fig 4 Case 9 Right sided a retroperitoneal abscess. Purulent thrombophlebitis of right ovarian vein. Left sided small retroperitoneal abscess.

same while the evening of July 8 a severe chill lasted forty-five minutes came on followed by axillary temperature of 104°/ and a pulse of 126. Four hours later (at midnight) another chill lasted forty-five minutes came and the temperature was 106°/ and soon later 107°/ by axillary measurement. The pulse became 140 and was counted 52 per minute. The patient was used. Under another light chill two hours later the temperature still remained at 106°/ and the afternoon it crept up again and the chill at 9 P.M. the temperature was again by axillary 107°/ with a pulse of 140. Streptococcus was repeatedly given with the purpose of influencing the drainage of the abscess. On the morning of July 10 the patient rectal temperature was 104°/ while the stoma brought another chill with 104°/ by axillary and 125 pulse. In mention these great variations in temperature somewhat a detail because they make a picture of the thrombophlebitic type of sepsis. Each time when the purulent melt of enormous thrombus reaches the end of the thrombus and instead of being blocked by further clotting empties itself to the free circulation of blood in the vein and sudden onset of high fever which may be followed by a renewed local clotting and sepsis.

In our case I knew that the ovaries were having a reasonable chance to unload themselves by way of the drainage but were not the terms of the bottom of these new hills. We mentioned above the right leg and the right groin. We had used a simple catgut for the bed of the excised uterus and adnexa. About the day could hope it would be absorbed and thus we would have been that pressure. The term of the new tree would be relieved by the opening of the lumina of the cut ends. At a rate renewed operation interfere with the redress. Was it better with the right groin dorsal drainage and the right groin

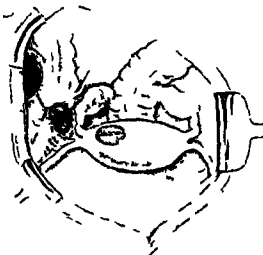


Fig. 1. One incision in the uterine wall, second incision below caecum and third on bet. abdominal wall and upper part of rectum.

non mysterious focus. Mysterious it appears because it lies deep and we perhaps cannot find it by palpation. Still in nearly all cases a tenderness or swelling will give some indication.

We are afraid of opening the abdomen. Why? Because we have no definite findings and because we are reluctant to add surgery of uncertain outcome to a case where we may perhaps feel somewhat guilty. Neither argument however ought to keep us back too long. My cases I hope will help to show that a local manageable condition is not infrequent.

In the hope that individual cases will illustrate certain possibilities in a clearer and more vivid manner I will now report my small surgical experience. While in my personal obstetrical work I did not have any deaths from infection or any very serious septic conditions, a number of cases of puerperal sepsis were referred to me. I remember only one case among these where surgery was to be excluded; this was on account of metastatic ulcerative endocarditis. I have however no record of all the cases I have seen and thus my memory may not be exact.

The first case I saw in this country was twenty on years ago. The attending physician considered the case hopeless. The patient made pitiful impressions and was extremely pale. She had had her child but it was still before. The right broad ligament was thickened. The

right leg was greatly swollen presenting the picture of phlegmasia alba dolens. Her fever was but slight and had been high for many days. The spheno-ligament felt as a chord, and in some places there was little reddening over the thickened vein. This indicated severe infection of the thrombosed vein with a peripheral abscess. Incision into the vein showed a purulent stream of small masses were then made in the leg. All of them liberating pus at least a thrombus, the process of purulent softening. There was no bleeding from any one of the incisions. The haemorrhage for the better occurred within forty-four hours. The high temperature as near the entrance of the spheno-ligament to the femoral vein. I propose that while the patient had good winding-off power opening the veins was of help in relieving the pus under pressure, and in thus checking the upward course of the thrombus with the breaking down following on it heel.

This was about as simple a form of puerperal infection as you could imagine would require surgical measures. It was a puerperal septic thrombophlebitis traveling most likely from the right uterine veins to the internal iliac then to the common iliac and from there peripherally to the external iliac, the femoral and the saphenous vein.

The second case was that of a brother practitioner. It was the third labor. After normal delivery he had set in about four days after the child was born. It soon reached very high temperatures, up to 106°. It kept high for about a week, during which time intra-uterine douches had been given. On February 6, 1902, the case was brought to me at Luke's Hospital and on February 17 we opened the abdomen by an oblique incision over the mass which was felt to be the appendix. In the caecum, omentum, found between omentum, parietal peritoneum and the outer wall of the caecum. It contained perhaps two to three teaspoonfuls of pus. The appendix was not connected with the caecum, was free and looked normal. A second incision of about the same size as the first one then found out the tone of the pelvis. Again it was carefully evacuated. Finally the right horn of the uterus was reached and thus seemed soft and fluctuant. Upon incision it yielded thick, yellow non-odorous pus about teaspoonful. The right tube was found coiled behind the uterus. It was open but somewhat thickened. It reddened especially where it lay close to the subcostal abscess. The left tube also showed no marked changes. The tubes are not the principal seat of the infection nor were the abdominal organs seriously involved. We thus have an uncontested case of peritoneal infection by direct suggestion of the pus through the uterine walls.

Two strips of iodine-form gauze were used for drainage. The wound was closed down. The drains by figure-of-8 sutures of silk worm gut. The packing was gradually removed as the temperature subsided and on March 3, ten weeks after the operation, the patient discharged with only a slight superficial wound remaining. Since then the patient has had two children and on no occasion.

The third case was seen September 1902. It was a grave form of puerperal sepsis. Eight days had passed since childbirth. A midwife had attended the patient and I could get no details. Examination revealed mass on the left side rather high up. We first opened the Douglas pouch per vaginam but did not strike pus. The abdomen was then opened by left sided oblique incision of an incision as I used on the other side of the abdominal wall. It contained about two teaspoonfuls of pus. By

nt dissection we could gradually free a mass, which
ved to be the left tube with infiltrated walls and of
size of the dex finger. The tube was removed
e ovary was large and covered with fibrin but was
undisturbed. The broad ligament much swollen and
hemorrhagic was incised and showed purulent infiltration
between its layers. The whole area was walled off by
gauze strips.

These are the notes made at the time. To-day I
might have added ligation of the veins, internal
ac and ovarian but at that time we were not
much aware of the power of localizing these
processes by venous ligation. The purulent
infiltration of the broad ligament may have
been breaking-down veins. The memory cannot
decide that.

In the night following the operation our patient became
delirious. Gradually the neck showed rigidity until
five days after the operation. Thirteen days after
childbirth she died of septic meningitis September 18
1900.

CASES 4 and 5 I had two cases of beginning diffuse
peritonitis due to perforation of the uterus during labor.
The first one happened while I was assistant to the Z. rich
University Hospital for Women. The case was reported
in the *Correspondenzblatt für Schweizer Ärzte* in 80
by Professor Wyder together with similar case of his
own, and was declared to be the first case on record of
surgically treated puerperal diffuse peritonitis with re-
covery. As it greatly resembles my second case, which
occurred at St. Gertrude Hospital on March 5, 1908 I shall
describe the latter and mention the former only where
it differs.

The second patient, small woman of 33 years, who
had her first child. The labor was protracted and when
her physician arrived and examined her he found a
forehead pressure tangent. Attempt was made to change
the position but when the physician was at the end of his
strength he called a colleague who again attempted
to turn the child. The second physician found the
uterus greatly contracted and his attempts he noticed
that he grasped handfuls of the mother's testicles, just
the pelvic calassita had felt my first. The diag-
nosis of perforation of the uterus was made and the case
brought to St. Paul. The patient looked somewhat
cyanosed, the abdomen was bloated, rather rigid and
mildly sore. The temperature was 38.3, the
pulse 48. The external genitalia were swollen and
bruised. The child was dead for over a day. It was of
course impossible to doubt the relation of things
removing the child. The uterine cervix, and
perforating portion of the child were to be considered as
grossly infected. The rest of the term was not to be
trusted. The skull of the child was opened
the cranium fitted over the orbit and the child died
red inflammation after removal of the placenta now
easily recognized. The abdominal cavity apparently
through the lowermost portion of the thoracic posterior
ly. Through this the obstetric hand must have
entered. There were no testicles lying the tear. It
seemed best to inspect the condition of the laparotomy, which
followed immediately. The uterus was 12 cm. long. A
large quantity of dirty brown slaty material was mopped
out of the lower half of the abdomen. There was no odor
however. The uterus and the intestines in the neighbor-
hood were greatly reddened. The peritoneum of the
uterine bladder black and large hematoma noted

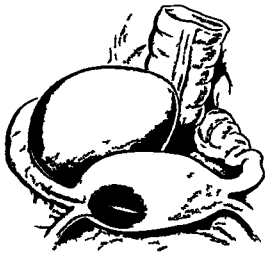


Fig 2 Case 7 Diffuse seropurulent peritonitic exudate. Abscess in wall of uterus, cuticle salpingitis ovarian tumor.

in the wall. The black torn edges of the perforation in
Douglas pouch were left as they were. A large drain was
inserted through the tear to the vagina. A gauze drain
was also left in the lower end of the abdominal incision.
The next forenoon the pulse was 40, the temperature 38.3.
The urine was bloody. Clot retention was
necessary. Streptolytic serum (20 ccm) were given
during the day. In the evening the temperature was 39.
The patient left the hospital in good condition
eighteen days after her admission.

I my Zürich case which I mentioned before the tea
was in front of the uterus the peritoneum was torn and
bruised for a stretch of 15 cm. The uterus and the ad-
joining intestines were highly reddened. The patient's
temperature was about 38. Flaky turbid maternal
was washed out of the abdomen with solution of salicyl-
cid (1:1000). No drain through the tear was employed
but the whole rest of the tea was inserted with two rows
interrupted sutures reinforced places by the suture.
The uterine cavity was then washed out. Our first
went back to L. R. I was informed that my patient had
come again to the hospital some 2 years later and had
gone through a perfectly normal non-instrumental child
birth.

It will be noticed that the lucky outcome in
both cases was principally due to the fact that
they came to operation in a very early stage of
the peritonitis.

CASE 6 Occasionally we may get picture of puerperal
sepsis with peritonitic upsurge, one confined
cavity in the pelvis. If rapidity of the development
fever and general condition indicate a very virulent
infection it is the best to save first to evacuate the pus
by a vaginal incision; and to avoid opening the abdomen
even if we find that we have to open the abdomen in the
same session. We thus have a wide drainage-openings
causing much less harm from local. Occasionally



Fig 3 Case 8. Grenou plac t l re of tru Septic metitis. Purulent thrombophlebitis of right ov r r n d t n e c i

though rather rarely the g l i n c t i o n m y s i c e f no second ry b s e n s e s o l r g e t h i c k e n g s c r b e p a l p a t e d f t e r t h e v a c u a t i o n O n e c h c a s e w e h a d i M r c h 9 0 9 T h e p a t i t r y l a r g e w m a r e f r e d t b o u t t h n w e e k a f t e r h i d b r t h T h e r e n o r m o u s b l o t n g f t h e b d o m e n O n t h e d y f d m w o n M c h t h t m p e t u r e s t o o d t 3 O n t h f o l l o w g d a y s t r e h e d t i l o n M r c h 6 W n e w e d t h c u l d e s a c a f t e r w h i h t e m p t r e n o r m l n d t h p r e s e n t w a s d i s c h r g e d o n M r c h 23

Here the puerperal infection resolved itself in a large single pelvic abscess though the appearance of the patient the great soreness and pain with the excessive bloating of the abdomen presented a clinical picture causing great anxiety

Cas 7 Mrs H A R 26 years old sent to St Joseph Hospital from the cou try on J u a r y 6 9 She had been delir ed w e e k p r e v i o u s l y a n d p r o m p t l y a f t t h a t h a d h i g h t e m p e r a t r e b l o a t e d h a d a b d o m i n a l p a i n a n d s o r e n e s s O r m a l t S t J o s e p h H o s p i t l t h e e v e n g h e r t m p e r a t r e w a 3 7 / p u l s e 5 0 h e c o n d i t i o n l o o k e d g r a T h e r e w a p r e p a r e n t l y n o d i f f u s e p e r i t o n i t i s T h e r i g h t o f t h e t l l r g e t e r m s w e l l i n g c o u l d b e m a d e o u t w h i h w e r y s o r e W d e c i d e d t o o p e r a t e t h a t s a m e v e n i n g t m e d i a n n c i s i o n w a s m a d F r e e s e r o p u s f o u n d t h e b d o m e n T h e r i g h t b e c e d e m t o u s a n d t h i c k e n e d T h e r i g h t o v a r y f o r m e d c y s t i c t u m o r t h e s i z e o f a n o r a n g e d e r e n t t h e l o w e r p o r t i o n T u m o r d i t b e r e r e m o v e d T h e t e r u s l t t l e l a r g e r t h a m f i t

reddened doughy cedematous Near the right horn of the teru t r d t h e a t e n o r u r l a c e t h r e a s b u l k y r a n e d f l u c t u a t i n g a r e a a b o t 2 1 / 2 t o 3 c m i n d i a m e t e r T h i w a o p e n e d a n d t h i c k y e l l o w p u s e x c a p e d f r o m a n i t r a m r a l b o c c e s A n i o d o f o r m g a u z e d r a m w a p l a c e d t t h e o p e n i n g T h e p a t i e n t w a s p u t t o b e d a n d p r o t o c h y 4 t r i e d D u r i n g t h n i g h t a n d t h e n e x t m o r n i n g t h e p u l s e w a 140 a n d t h e t e m p e r a t u r e 104° b u t b y e v e n i n g t c a m e d o w n t o 100° / t h o s p u l s e W h i l e t h e t e m p e r a t u r e n e e r r e h e d h i g h d e g r e e t w a s m o r e t h a t w e e k b e f r e t p e r m a n e n t l y s t a y e d b e l o w 100° T h w d u e p a r t l y a t l e a s t t o a n a b s c e s s i n t h e b r e a s t w h i h w a l a c e d o n J a n u a r y 6 a f t e r w h i c h t h e p a t i e n t w a a b l e t o b e o u t o f b e d S h e e n t h o m e i n g o o d c o n d i t i o n o n F e b r u a r y 23 f o u r w e e k s a f t e r e n t e r i n g t h e h o s p i t a l S i n c e t h e p a t i e n t h a s h a d n o m a r r i a g e S h e f e e l s e l l

Perhaps the most interesting one of my cases of puerperal infection was the following one

CASE 8 The patie t farmer wif 33 years old had 3 previous chldbirths On June 3 92 he had very difficult instrumental delv ery nd gave birth to triplet The first one necessitated forceps and hnd the second one brought to the world three hours later by apparently ery difficult version was dead The third ne hnd deid as l k e n e d e l i v e r e d b y v e r s i o n A l l t h r e e h l d r e w e r e l a r g e T h e p l a c e n t w a s c r a p e d o f f i t l o d g e n d e r g r e a t d i f f i c u l t y T h e u t e r u s w a s u r g a t e d f t e r t h t w t h c o r r o s s b l m a t s o l u t i o n T h e d a y f t e r t h e d e l v e r y t h e t e m p e r a t u r e e n t p t o 103 t h e p u l s e t o 120, a n d h e r p h y s i c i a n a d m i n i s t e r e d p o l y v a l e n t t t r e p t o c o c c u s e r u m t h r e e t i m e s d a i l y f o r 5 d a y s w i t h o u t a n y b e n e f i t L i g h t d a y s f t e r h e r d e l v t r y b e w a s p u t t h e t r a i n a n d e n t t S t J o s e p h H o s p i t a l H e r t e m p e r a t u r e 103 / o n h e r r i l b e p u l s e 120

f o r s p e c t i o n o f t h e c o n d i t i o n h e t a k e n t h e o p e r a t i n g r o o m d b y e r y g e n t l p r i n t n g b l a n t c u r e t t i n g t a s f o u n d t h t t h e r e w a s n o r e t e n t i o n o f p l a c e n t a p l a c e n t l t h r o m b i s T h e t e r u s r e g a t e d a n d g r a z e t r i p s a t r a t e d w t h c a b o l c a m p h o r (c a r b o l a c d 3 p e r c e n t c a m p h o 60 p e r c e n t k o h o l p e r c e n t) w a s i n s e r t e d T h e t e m p e r a t u r e t h o u g h s t i l l 103 / t h v t f o r e n o o n u n d e r r e p e a t e d u r g a t i o n a n d r e n e w e d a s s e r t i o n o f i o d o f o r m g a z e t r i p s s a t u r a t e d w i t h c a r b o l c a m p h o b e c a m m o r e r e a s o n a b l e s o t h a t f r o m t h e f o r e n o o n o f J u n e t l l e a r l y m o r n i n g o f J u n e 8 t r i g g e d f r o m 100° t / f e w t i m e s e v e n s t r a i n i n g t h e 90 m a r k i n t h e m o r n i n g v e r t e b r e l e s s b y n o n a n J u n e 8 t h e t e m p e r a t u r e w a s 101 3 / a n d o n t h e n e x t d a y t r o u n d 103 m o s t o f t h e t i m e O n J u n e 30 h e h a d a c h i l l l a s t i n g e i g h t m a n t e s a n d t h t e m p e r a t u r e r e a c h e d 107 / I t b e c a m e p l a t h t e r e g o i n g t o l o s e p r i e t i f t o t h g d e f i n i t e c o u l d b e d o n e F o n o n J u n e 7 t e e k s f i e t h d e l v e r y t h e f i d u s s t i l l t o o d 8 c m b o t h e y m p h y s i c n d o n l y 4 c m b e l o w t h n a l T h e t e r u s w a b u l k y n o d f i n i t e e x a n d c o u l d b e f l t o n p a l p a t i o n b u t t h e p a l p a t i o n h a d, o f c o u r s e b e v e r y g e n t l W j u d g e d t h a t t h e p l a c e n t a l r e a s a n d t h t e r u s r e t h e m a s e a t o f t h e t r o u b l e t h c h i l d w i t h l a c k o f b u l k y e r u d t o t e l d u s t h t s o m e w h e r e b r o k e n d o w n t h r o m b u s w a s t r e c l o n e d a t w h i l e t h e r a t h e s t r a d y h i g h f e v e r d i c a t e d t t h s a m e t i m e c o n s t a n t l y m p h i s c o r p s i o n T h e c a s e l o o k e d d e s p e r a t e a n d i f t e d t o r a k a u r g e n t t r e m p n o t i m e c o u l d b e l o s t I t l o o k e d t h o u g h w e h a d t r e d t o o l o n g W d e c i d e d t o o p e n t h b d o m e a n d c a s e o f n e g a t r e f i n d i n g s t o r m o v e t h e l a r g e t e r u s y w a y T h i s w a s d o n e b y m e d i c a t i o n t h e f o r e n o o n o f J u l T h e

uterus was very large, doughy and reddened. From the somewhat diffusely thickened right broad ligament a hard nodule which corresponded with the right ovarian cyst was felt running retroperitoneally over the lesser iliac fossa to the kidney region. In the region of the lesser iliac fossa it had the thickness of the handle of an ordinary carpenter's hammer. It became less bulky after the removal of the uterus with the adnexa supra-umbilically and drained widely through Douglas's pouch. Then we did something which I am not decided whether I shall do a next time or not as it seemed out to be more traumatic than that at first appeared to be. Starting at the right edge of our abdominal incision we detached the peritoneum from the remainder of the abdominal wall until we were behind the ascending colon. Thus we reached the mentioned hard chordlike mass. It proved to be the thrombosed ovarian veins. The surrounding infiltrated areolar tissue and the sinuses were opened as far as possible. The mass near the lower pole of the kidney where the veins had gathered into one bleeding occurred. The ureter as not discernible. The patient's condition was none too good and seemed to require manipulation of these purulent breaking down thrombi. A gauze dressing saturated with carbolic camphor was put over the opened area and led out through a lumbar tube. The peritoneum was then allowed to fall back to place and the abdomen was closed. The operation had consumed fifty-five minutes; the pulse after the operation was 120 and twelve hours after the operation had gone down even to 96 with a temperature of 100°.

The favorable outcome in this case proves that we need not feel as anxious to get in quick and get out quicker as we do in diffuse peritonitic conditions, but rather to consider the time of less importance holding foremost in our mind the duty of surveying all the pathology so as not to overlook abscesses or thrombosed vessels. This I consider an important point. With experience we shall not tackle entirely hopeless cases but shall make it a point to go more fearlessly at a thorough investigation where the general condition is not too advanced. The thoroughness is more important and the patients stand a fair-sized opening of the abdomen quite well. It is of course of utmost importance that we do not seal our wound and the peritoneum more than is absolutely necessary. This can be better accomplished by a sufficiently large incision. In closing such abdominal wounds is by far the best suture material. We avoid even fine catgut as much as possible. It makes too readily a culture medium.

Return to our case. The uterus on opening after its removal bled freely; sloughy placental area. On the day following the operation the temperature reached only 100° and on the next day not more than 100°. But alas we were not at the end of our troubles. On the evening of July 4 the temperature rose again. There was very offensive odor to the vaginal discharge. On July 5 considerable pain in the right leg and the right groin. The temperature crept up to 103°. During the following two days the condition remained about the



Fig. 4. Case 9. Right-sided acute pyelitis. Tubo-ovarian abscess. Purulent thrombophlebitis of right ovary. Left-sided intra-abdominal abscess.

same while on the evening of July 8 a severe chill lasting forty-five minutes, came on followed by aillary temperature of 104° and pulse of 60. Four hours later (at midnight) another chill lasting twenty-five minutes came and this time the temperature was 106° and soon later 7/11 by aillary measurement. The pulse became weak and was counted 120 per minute. The patient was nauseated. Under another light chill two hours later the temperature fell to 100° and at 106° four hours afterward at 6 A.M. it dropped to 99°. In the afternoon it crept up again, and after chill at 9 P.M. the temperature was 102° by axilla 102° with 143 pulse. Antistreptococ serum was repeatedly given without apparent influence. Again a drop of blood toward morning of July 10 99° per rectum with 110 pulse while the afternoon brought another chill with 104° by axilla and 52 pulse. I met these great reactions in temperature somewhat neglected because they make perfect picture of the thrombophlebitic type of sepsis. Each time when the purulent melting of venous thrombi reaches the end of the thrombus and instead of being blocked by further clotting empties itself to the free circulation of blood we have a chill and a sudden onset of high fever which may be followed by renewed local clotting and sepsis.

In our case which was the ovarian veins were having a reasonable chance to unload themselves by way of the drainage. But we were not the uterine veins at the bottom of these new hills. We mentioned how on July 11 the right leg and the right groin were used simply continuous catgut for the bed of the excised uterus and adnexa. In about ten days we could hope it would be absorbed and thus we would have a chance that the pressure in the internal iliac vein would be released by the opening of the lumina of the cut vein. At any rate renewed operation interference appeared needless. We waited better discharge through our dorsal drainage and the given

in the great majority of surgical procedures is added that of the general anesthetic. In the recent more improved method of general anesthesia this may be practically eliminated as a shock producing factor yet it nevertheless has its dangers in the derangement to the pulmonary and particularly in prostatectomy renal complications.

These cases present another danger fully as great as any of the above which I believe is responsible for a large proportion of the mortality in these patients a danger peculiar to this case.

Few patients requiring prostatectomy present themselves for operation before they have seriously felt the inconvenience of this condition. Many have probably already been initiated into catheter life. Some have had one or more attacks of acute retention of urine from prostatic congestion and practically all will have considerable residual urine and possibly some renal complications. Nearly all are disturbed frequently at night by having to arise to urinate. The kidneys have gradually accustomed themselves to this condition and are working again to considerable back pressure and the sudden relief of this pressure at operation completely upsets the renal equilibrium leading to congestion with diminished excretion or probably anuria. Here lies the particular danger in these cases and to avoid it we must first relieve the bladder and permit the kidneys to recover by performing these operations in at least two stages in all cases that show much residual urine or are suffering from retention at the time of operation. The danger too of suddenly relieving a distended bladder in these cases cannot be overestimated. A renal hemorrhage may occur associated with renal apprehension. In my observation this procedure alone has caused as great a mortality as prostatectomy.

In extreme cases such bladders should never be opened at once unless briefly incised and the danger of general infection too great for this. They should be gradually evacuated by catheter removing but a portion of the urine at a time at two- or three-hour intervals or if almost completely emptied one-fourth to one-third as much boric acid solution injected as there was urine removed. This gradual emptying process should consume from twenty-four to forty-eight hours before the bladder is opened.

Rarely a case is met with in which there is considerable distention and the passage of a catheter too painful, difficult or even impossible of accomplishment. In such cases if the suprapubic incision is carried down to the bladder the bladder can then be emptied by a gradual

process of a punctation at intervals of several hours gradually withdrawing more and more at each successive punctation thus overcoming the difficulty. During these intervals the suprapubic wound is kept packed. After twenty-four or forty-eight hours the bladder which is now fairly collapsed can be opened with safety.

The method of performing the cystotomy and of dealing with the bladder afterwards is of some consequence. It may be opened with a free incision with the introduction of a tube or catheter to its base and the attachment of some syphon apparatus or the escape of urine may be effectively controlled by making a small buttonhole opening into which is passed a Pezzer catheter. The incision is then infolded and held by two stitches one placed on either side of the catheter. Such a valve-like closure will leak very little if at all.

The advantage of this last method is quite apparent as it permits the collection of all urine and in this way the functional activity of the kidneys can be accurately gauged. It will usually be found that the urinary excretion for the first two days diminishes considerably following the cystotomy gradually increasing from the third to the fifth day and is about normal by the end of the first week. By the time if the patient's general condition is good a shower by normal appetite with good digestion free bowel movements and after a few nights normal restful sleep free from the annoyance of frequent urination the removal of the prostate can be undertaken.

If any question exists regarding the condition of the kidneys a further delay is necessary or their capacity may be tested by phenolphthalein and under no conditions should the prostatectomy be attempted until they have reached a fairly normal condition of elimination. By handling patients in this way many bad results and febrile individuals may be safely earned through the surgical ordeal.

During the interval between the suprapubic cystotomy and the prostatectomy the bladder should be washed once or more daily with warm boracic solution and the suprapubic wound kept lightly packed and any infection in the cellular plan which may have occurred which however rare should be well under control before the final operation is attempted. It is usually noticed that the prostate diminishes decidedly in size following the cystotomy due to the relief of the congestion and this diminution in size facilitates its later removal.

For the suprapubic cystotomy the bladder is

first irrigated freely through a catheter with boracic acid solution and left moderately distended

The injection of the field with the local anæsthetic solution is preferably completed before the incision is made infiltrating the skin and subcutaneous tissues in the middle line for a distance of three or four inches and then passing a long fine needle down through the skin to the anterior rectal sheath. This sheath is recognized as the first plane of resistance which the needle encounters after the skin is passed. The sheath is gently penetrated injecting as the needle is advanced for about one-half to one inch further and the interval between the recti infiltrated. This procedure is repeated at several points along the proposed line of incision. Near the pubis the injection is carried a little deeper into the prevesical space always injecting as the needle is advanced. If any uncertainty is felt regarding this last deep injection it can be omitted until the recti are separated and the deeper parts brought into view.

After the incision the parts are gently retracted progressively advancing until the bladder is reached the cellular tissue over it is divided and pushed up with the peritoneum out of the danger zone. In making this suprapubic incision it is advisable not to approach too closely to the pubis but to keep one or two inches away from this point—the distance depending upon the size of the bladder—and yet the incision must not be too close to the peritoneum. This method has the advantage of avoiding the possible danger of suppuration in this space and facilitates the more rapid closure later of the fistulous opening for the nearer these openings are to the peritoneal reflection the quicker seems to be their closure. Those suprapubic fistulae which have been difficult to close have always been close to the pubes.

The superior bladder wall is not, as a rule very sensitive but it should be lightly infiltrated before being incised—one stitch on each side fixes the upper part of the bladder to the posterior rectal sheath the bladder is then freely irrigated and its cavity explored determining the size and shape of the intravesical projection of the prostate removing calculi should they exist, and obtaining any other information which may be necessary. If a direct visual inspection is desired in cases in which complications are suspected this can be easily accomplished by evacuating the contents of the bladder and by placing the patient in the Trendelenburg position. Air will enter and dilate the bladder and its

interior can thus be freely inspected by gently retracting the incision. Or if preferred a short proctoscope with light attached may be passed within the cavity.

If much intravesical examination is necessary or it is desirable to examine the vesical cavity digitally some form of intravesical anæsthesia then becomes necessary. For this purpose I have found it both inadvisable and unnecessary as well as ineffective to attempt to anæsthetize

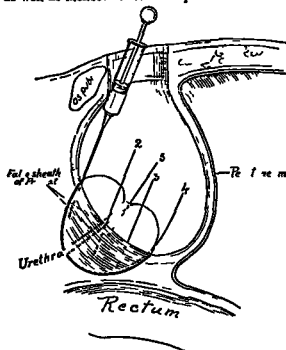


Fig 1. A. Thor's method for injecting prostate. Lines 1, 2, 3, 4, 5 indicate points for injection above and on sides of prostate. 4, 5, beneath prostate—this may be more conveniently made by a curved needle. 5, enters urethral opening penetrates urethra and is made between lobes of gland. While the lines show the axis of the injections with the prostate lying normally as it lies when the injections are made the prostate is lifted up by a finger in the rectum so that the needle can be more readily entered the proper position through the suprapubic opening.

the interior of the bladder for cystotomy and suprapubic manipulations within it by filling it a short time before with anæsthetic solutions. This procedure is now resorted to only for cystoscopy. For all manipulations and operations within it direct injections are made into or around the field to be operated.

The particular sensation with which the bladder is endowed and which is felt upon any abnormal contact with its walls, either internally or externally is that feeling which we term the desire

a y f the catgut n th pelvic wound or w it pri cipal ly f favorable f te in th form of great immunit g po er of the patient? At ny rate July 11 the elev th day after the operation the temperat re remained more moderat It rose nly to 1 / On July 1 the tem perature ranged between 98°/ nd 100 On the follow ing day the patient was allowed to sit up a chair on acco t of a sore back On J y 16 I find th first not that the pat e t w s allowed to walk bout and o July 30 he went home The recovery then progressed without further trouble A yea and half later I J uary 9 4 upon my request she came to St P al for control My notes of that date read She is well though t times a little weak he does he house l and while before her sickness h usual weight as 35 pound she now eighs 38

In this case as in abdominal hysterectomy for inflammatory and fibroid conditions we removed the uterus after clamping the broad ligaments on both sides It would then have been better to do as we did in the case that, to follow, i e not to ligate or suture over the clamps, but to remove first the clamps one by one and to gra p only the bleeding vessels individually with fine artery forceps for ligating The more extensively the broad ligament is thrombosed the more desirable it becomes to catch only the bleeding ves sels and to leave wide open all thrombosed ones

CA 29 Mrs P G had norm l labor The bld w born before her physica r med on J uary 3 9 3 The fterbirth came a y early d complete There was slight tea which the doctor repaired with three tiches On th third day eryth g wa norm l On the fourth day she begn t compl of headache d as not feel ng very w ll from then on On the veth day he physica saw her g and found th t mperatue 100 1/4 in the aft noon nd the pulse over 100 She had pain in her side and slight enlargement There as tender ness in th right lia side After bout four day th t mperat re rose to 103 nd on J uary (seventeen days aft her labor) he b d se re chill f lower by fev of 104 vth pulse of The f llowing afte noon sh was sent t St Paul

There was m h bloating of the bdom nd soreness on the right side f the lower bdomen where a ry tender though not ery d t tect mass s f t The uterus as not bnormally large for the t me lapsed since the d livery It as found t to cont n ny bnorm l remains on very gentle blunt current ng nor did s notic a foul discharge The terus wa tixed in moderate dextro retroversion On J uary I dictated I rom th position f the uterus a d the chills nd t constant fever ha to diagnose thrombophlebitis seps located especilly t the right t nine nd right ovarian ems Th highest temper ture on Ja ry th day f he arrival was 103°/ nd on the following day 103°/ with 1 s pulse The rect m wa found impacted, nd fier an enema the patient f t m ch better Nevertheless, Janua y 3 the temperat re after havi g been 98°/ the morning reached 104 3/ for sev al hours The next morning, fter a good night t measured 101°/ by axilla but in the fternoon f llowing hall of twenty m tes d ration t ent p to 104 1/2

On January 5 the abdomen a s poned The bowels were found greatly ballooned Th terus doughy co taining small fibroid is fied toward the right where the

tube is f und very m h thickened nd a abscess is opened whil w try to detach some f filtrated omentum from it This abscess has a oute w ll the peritoneum of the liac fossa The mesosalpinx is filtrated and thus thicken ng reaches t the infu d bulopel ic fold back and to the area of the common liac vessels The ppendix found acutely reddened and fied to the tube is removed On lamping the t nine end of the t be some pus wells out at the site of th lamp O clamping off the tube from the ry which w first tended to leave the ovary f nd frabl nd unspicuously juicy so that it decided t remove t On clamping the ovarian vessels behind the ov ry pus again ooses out from the clamped area (vems?) Aft the adnexa are cut a y the mesosalpinx is washed with fine ran ng catgut to the ter third Now in rde to find the tent of the suppuration along the o ran vessels we release the clamp before sewing How ever no pus comes forth nor can any be milked out from above The uterus is very doughy nd soft near its right born nd stab w and is made there to see if could strike pus h pus bow however In freeing the left adnexa a small bcces w th few drops of pus appears ca the terine born t be as sal as possible the po terior peritoneum then divided ove the left common liac area The na vet though t shows no sign of thickening t th t post t is ligated One fine suture reunites the peritoneum ver it After this the Douglas s widely opened over a curved clamp previously inserted t to the agna At be nd gauze dras are thus pulled dou through the opening t the agna, hile above rubber dam nd gauze dras are inserted to the right l ac fossa through a stab ound This drains th bcces

The temperature rose ery high after the operation On the third day it reached 104 There are no more hills F days after the operation the temperature was 100 n the fternoon O fbruary 4 the bdominal, nd on the f llow g d y the ginal drains were removed On Fbruary 4 one d y less the three weeks fter the operation ou pat t w t t her home Wisconsin She is reported by her physica as well

This finishes our series I should have liked to add a case of a man who was sent to me as a cryptogenetic seps-is, with temperatures over 106° where the ligation of the internal liac ven saved our patient from sepsis originating in the vesicoprostatic plexus This would lead us, however away from the subject of puerperal sepsis I shall report the case soon under a separate heading To summarize our findings, we had in

Case 1 A severe purulent thrombophlebitis
Case 2 Severe seps One abscess in the wall of the fundus uteri and two separate intra abdominal abscesses

Case 3 Intraperitoneal abscess pyosalpinx suppuration in broad ligament meningitis death

Cases 4 and 5 Beginning diffuse peritonitis after perforation of uterus

Case 6 Large pelvic abscess
Case 7 Diffuse seropurulent peritonitis erudate acute salpingitis ovarian tumor abscess in the wall of the fundus uteri

Case 8 Severe infection of placental area of uterus purulent thrombophlebitis of right ovarian and uterine veins extirpation of uterus opening and draining of ovarian vein

Case 9 Right-sided acute pyosalpinx tubo-abdominal abscess purulent thrombophlebitis of right ovarian vein left-sided intra abdominal abscess drainage of right ovarian vein and ligation of left ovarian vein

The more we find localized changes in a case the more definitely it becomes surgical. Our plea however is not to wait for the moment when by overwhelming proof we might be forced to use the knife but in each case where the symptoms become alarming to watch for the time when surgery can do good and not let that moment slip by. Only practical experience to be sure, can teach us in difficult cases where surgery would be inadvisable or where waiting would mean defeat.

European literature is very lukewarm as to surgical interference and in general so is our own notwithstanding the fact that Hirst of Philadelphia has reported most remarkable results.

Before closing I should like to emphasize the importance of Trendelenburg's ligation of the veins. This was a truly great step ahead. This blocking of the venous infection should not be done it seems to me without opening the peritoneal cavity or without a sufficient investigation of the whole condition. It ought to be combined with whatsoever other surgical measures become necessary. In opening and draining the infected veins if the condition calls for it we obviate the objections of one of our recent American writers that Trendelenburg's operation only locks up the thief but does not dispose of him.

Our cases illustrate that each one is a problem for itself just as would be the case in a pyogenic infection in a complex part of the body. We have a widespread raw surface after childbirth and any pyogenic germ may produce trouble as soon as it is given a chance. Puerperal infection like a pyogenic infection in any part of the body may better be treated conservatively under certain conditions or for a certain length of time, but it must be treated with a view to surgical intervention and with surgical knowledge.

PROSTATECTOMY UNDER LOCAL ANÆSTHESIA¹

By CARROLL W ALLEN M.D., New Orleans

IN the operative relief of hypertrophy of the prostate we have in the great majority of cases to consider certain factors which are not as a rule involved in other surgical procedures namely those of age, as most of the cases requiring surgical relief for this condition have reached or passed middle age, and many of them are infirm or weakened by suffering and infection. In the old and feeble prostatectomy is a formidable operation though not attended by a greater mortality than that following any other major operation in the same class of patients. However it may even show a more favorable comparison by observing certain methods in the handling of these cases.

Surgical technique has reached such a stage of perfection that in the more commonly performed operation it would seem difficult to suggest improvements in the recognized methods of procedure in typical cases. Improvements will come but I believe that they will be more in the preparatory treatment general handling of the case and refinement in details rather than in the

general principles involved in the operation. One of the notable advances recently introduced as a general surgical procedure is the anoci-association of Crile. This I believe to be a factor of great consequence particularly when applied in old and feeble patients, as it prevents shock producing impressions from the field of operation from reaching the higher nerve-centers.

The method which I wish to present today is the result of a process of gradual evolution and improvement in handling these cases. Beginning with the two-stage operation and the adoption of the anoci-association principles to control shock and the logical addition of adrenalin for the control of hemorrhage it has gradually progressed to the point of complete elimination of all general anesthetics which are now never necessary but which however should be preferred in undoubted malignancy of the prostate in which methods of infiltration should be avoided.

The two great factors in the production of shock are trauma and hemorrhage and I to the e-

in the great majority of surgical procedures is added that of the general anæsthetic. In the recent more improved methods of general anæsthesia this may be practically eliminated as a shock producing factor yet it nevertheless has its dangers in the deranged stomach possible pulmonary and particularly in prostatectomy renal complications.

These cases present another danger fully as great as any of the above which I believe is responsible for a large proportion of the mortality in these patients a danger peculiar to these cases.

Few patients requiring prostatectomy present themselves for operation before they have seriously felt the inconvenience of this condition many have probably already been initiated into catheter life some have had one or more attacks of acute retention of urine from prostatic congestion and practically all will show considerable residual urine and possibly some renal complications nearly all are disturbed frequently at night by having to arise to urinate. The kidneys have gradually accustomed themselves to this condition and are working against considerable back pressure and the sudden relief of this pressure at operation completely upsets the renal equilibrium leading to congestion with diminished excretion or probably anuria. Here lies the particular danger in these cases and to avoid it we must first relieve the bladder and permit the kidneys to recover by performing these operations in at least two stages in all cases that show much residual urine or are suffering from retention at the time of operation. The danger too of suddenly relieving a distended bladder in these cases cannot be overestimated vesical hemorrhage may occur associated with renal suppression. In my observation this procedure alone has caused as great a mortality as prostatectomy.

In extreme cases such bladders should never be opened at once unless badly infected and the danger of general infection too great for delay. They should be gradually evacuated by catheter removing but a portion of the urine at a time at two- or three-hour intervals or if almost completely emptied one-fourth to one-third as much boric acid solution reinserted as there was urine removed. This gradual emptying process should consume from twenty four to forty eight hours before the bladder is opened.

Rarely a case is met with in which there is considerable distention and the passage of a catheter too painful difficult or even impossible of accomplishment. In such cases if the suprapubic incision is carried down to the bladder the bladder can then be emptied by a gradual

process of aspiration at intervals of several hours gradually withdrawing more and more at each successive aspiration thus overcoming the difficulty. During these intervals the suprapubic wound is kept packed. After twenty four or forty-eight hours the bladder which is now fairly collapsed can be opened with safety.

The method of performing the cystotomy and of dealing with the bladder afterwards is of some consequence. It may be opened with a free incision with the introduction of a tube or catheter to its base and the attachment of some syphoning apparatus or the escape of urine may be effectively controlled by making a small buttonhole opening into which is passed a Pezzer catheter. The incision is then unfolded and held by two stitches one placed on either side of the catheter. Such a valve-like closure will leak very little if at all.

The advantage of this last method is quite apparent as it permits the collection of all urine and in this way the functional activity of the kidneys can be accurately gauged. It will usually be found that the urinary excretion for the first two days diminishes considerably following the cystotomy gradually increasing from the third to the fifth day and is about normal by the end of the first week. By this time, if the patient's general condition is good as shown by normal appetite with good digestion free bowel movements and after a few nights normal restful sleep free from the annoyance of frequent urinations the removal of the prostate can be undertaken.

If any question exists regarding the condition of the kidneys a further delay is necessary or their capacity may be tested by phenolsulphonephthalein and under no conditions should the prostatectomy be attempted until they have reached a fairly normal condition of elimination. By handling patients in this way many bad risks and feeble individuals may be safely carried through the surgical ordeal.

During the interval between the suprapubic cystotomy and the prostatectomy the bladder should be washed once or more daily with warm boric acid solution and the suprapubic wound kept lightly packed and any infection in the cellular planes which may have occurred which however is rare should be well under control before the final operation is attempted. It is usually noticed that the prostate diminishes decidedly in size following the cystotomy due to the relief of the congestion and this diminution in size facilitates its later removal.

For the suprapubic cystotomy the bladder is

st irrigated freely through a catheter with racic acid solution and left moderately dis-

The injection of the field with the local anæsthetic solution is preferably completed before the incision is made infiltrating the skin and subcutaneous tissues in the middle line for a distance of three or four inches and then passing a fine needle down through the skin to the interior rectal sheath. This sheath is recognized as the first plane of resistance which the needle encounters after the skin is passed. The sheath is gently penetrated injecting as the needle is advanced for about one-half to one inch further and the interval between the recti infiltrated. This procedure is repeated at several points along the proposed line of incision. Near the pubis the injection is carried a little deeper into the perivesical space always injecting as the needle is advanced. If any uncertainty is felt regarding this last deep injection it can be omitted until the recti are separated and the deeper parts brought into view.

After the incision the parts are gently retracted progressively advancing until the bladder is reached. The cellular tissue over it is divided and pushed up with the peritoneum out of the danger zone. In making this suprapubic incision it is advisable not to approach too closely to the pubis but to keep one or two inches away from this point—the distance depending upon the size of the bladder—and yet the incision must not be too close to the peritoneum. This method has the advantage of avoiding the possible danger of suppuration in this space and facilitates the more rapid closure later of the fistulous opening for the nearer these openings are to the peritoneal reflection the quicker seems to be their closure. Those suprapubic fistulae which have been difficult to close have always been close to the pubes.

The superior bladder wall is not as a rule very sensitive but it should be lightly infiltrated before being incised—one stitch on each side fixes the upper part of the bladder to the posterior rectal sheath. The bladder is then freely irrigated and its cavity explored determining the size and shape of the intravesical projection of the prostate removing calculi should they exist and obtaining any other information which may be necessary. If a direct visual inspection is desired in cases in which complications are suspected this can be easily accomplished by evacuating the contents of the bladder and by placing the patient in the Trendelenburg position. Air will enter and dilate the bladder and its

interior can thus be freely inspected by gently retracting the incision. Or if preferred a short proctoscope with light attached may be passed within the cavity.

If much intravesical examination is necessary or it is desirable to examine the vesical cavity digitally some form of intravesical anesthesia then becomes necessary. For this purpose I have found it both inadvisable and unnecessary as well as ineffective to attempt to anesthetize

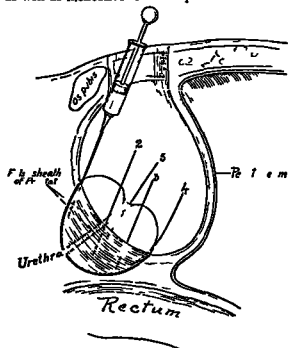


Fig. Author's method for injecting prostate. 1, 2, 3 indicate points for injection above and on side of prostate; 4, beneath prostate—this may at times be more conveniently made by curved needle; 5 enters urethral opening. Penetrates urethra and is made between lobes of gland. While the lines show the axis of the injections with the prostate lying normally in its bed when the injections are made the prostate is lifted up by a finger in the rectum so that the needle can be more readily entered the proper position through the suprapubic opening.

the interior of the bladder for cystotomy and suprapubic manipulations within it by filling it a short time before with anæsthetic solutions. This procedure is now resorted to only for cystoscopy. For all manipulations and operations within it direct injections are made into or around the field to be operated.

The particular sensation with which the bladder is endowed and which is felt upon any abnormal contact with its walls, either internally or externally is that feeling which we term the desire

to urinate. This feeling is more easily excited by manipulation from within and always more acutely toward the vesical neck and prostate region. Pain is only complained of when these manipulations have been rough or when actual trauma has been inflicted. The introduction of a finger within the bladder for purposes of exploration excites a desire to urinate and this desire may become particularly urgent and always becomes so when the parts near the vesical neck are touched. It is not a pain but still may be quite unbearable and demands some effective method to control it. This is accomplished in but a few moments of time. The bladder is first well irrigated and then emptied with the patient in the Trendelenburg position to dilate the cavity and bring its base into plain view. The anæsthetic solution is injected with a long fine needle at four or five points around the vesical neck, injecting about one half dram at each point. The needle is advanced just through the mucous membrane with a quick thrust injecting the solution as the needle is advanced. Unlike the skin and most other tissues the bladder is tardy in recording its sensations and anesthesia results before any sensation is felt from the punctures. Ordinarily these injections around the vesical neck are sufficient for all intravesical manipulations which can now be undertaken with the greatest freedom. However in complicating conditions where the lateral walls are to be operated upon further infiltration around the field becomes necessary. But as most nerves reach the bladder near its base and around the vesical neck, the injections made here are most effective in controlling its sensation.

If the case is one that does not come within the class requiring a two-stage operation but the patient is in fairly good physical condition with good kidneys and with but little residual urine and no bladder infection the prostate may be anesthetized and removed at once.

Whether this be done in a one or two-stage operation certain preparatory measures are advisable. One hour before operation a suppository containing 10 gr of anæsthesin is placed in the rectum to anesthetize this region and prevent any discomfort when the finger is introduced here in elevating the prostate at the same time one hour before operation a hypodermic of morphin $\frac{1}{6}$ gr and scopolamin $\frac{1}{150}$ gr is administered to lessen psychical disturbances.

If the case is one in which a cystotomy has previously been done the Pezzer catheter or tube is removed from the suprapubic opening. The

wound is found presenting a granular surface sloping down toward the vesical opening. This is more effectively and quickly anesthetized by passing a fine needle through this granular surface and injecting just beyond. By beginning these injections above under the skin margin the needle can be advanced obliquely in several directions creating a zone of anæsthesia just external to this wall of granulation tissue which will diffuse in all directions, blocking re-fibers which come into the field. This is done on both sides and carried down to the vesical opening. Injections are similarly made above and below the limits of the wound in the subcutaneous tissues in the median line as the wound has probably contracted and will have to be enlarged. The passage of a fine needle through this granulation tissue causes no pain and for that reason is preferred to passing the needle from the skin down. A finger is passed into the bladder to outline its upper limits and determine the proximity of the peritoneal cavity above. Additional injections are now made into the upper wall of the bladder with the finger within guiding the point of the needle.

The bladder opening is enlarged and the patient placed in a moderate Trendelenburg position. After the bladder is well irrigated and emptied either with a large syringe or sponges, its walls are then retracted by long deep narrow retractors, bringing into view the field of the prostate. Depending upon the size and shape of the prostate several points are selected for injection on the vesical surface, usually one below the opening of the urethra near the base of the gland and one on either side. The needle is passed through the mucosa with the idea of making the injection between the true and false sheath of the prostate as it is in this plane that the solution must diffuse around the gland, and it is in this plane that its enucleation is effected. It is here where the large venous plexuses are situated and where the nerve-filaments are more easily reached as they pass through to the prostate.

Two or three drams of a $\frac{1}{2}$ per cent novocaine solution containing 10 minims of adrenalin to the ounce are injected at each of the above points. The needle is then passed into the urethral opening and the lateral wall pierced first on one side and then on the other and similar injections are made at these points. During these injections the finger is kept within the rectum to better guide the passage of the needle around the prostate where its point can be felt passing between the gland and its false capsule.

It also facilitates these injections by elevating or manipulating the gland and guards against the penetration of the false capsule by the needle.

If the gland is very large or there is much of a projection above the urethral opening an additional injection can be made here. Otherwise the above will prove sufficient. It is well now to wait two or three minutes for the solution to diffuse and thorough anæsthesia to be established before beginning the enucleation. While waiting for the solution to diffuse the action of the adrenalin is observed in the prostate which becomes quite pale and bloodless.

In making the injections, should they be made into the substance of the gland itself no harm will be done only they are not quite as effective as when injected peripherally between the true and false sheath. Any excess of the solution thrown into the gland in this way is removed during its enucleation and not absorbed. Following these injections a catheter is passed into the bladder. The enucleation of the gland can now be undertaken by any method preferred by the operator and will be absolutely free from all pain or other discomfort. If the intra urethral method is chosen the passage of the catheter can be omitted until later but I have always found its presence a convenient guide to the location of the urethra during the different stages of the operation. A most striking feature is the absence of all bleeding only a few sponges being slightly soiled the loss of blood amounting to not more than one or two drams at most. There is no blood to swab out of the bladder afterward.

The catheter which has been left in the urethra is now utilized to draw through the urethra from the bladder outward a stout piece of silk which has been doubled and passed through a plug or pad of iodoform gauze arranged somewhat

cone-shape and about the size of the cavity left by the removed gland. The silk thread is long enough to reach beyond the glans penis and when pulled upon draws this plug effectively into the cavity thus insuring against any possible secondary hæmorrhage. The plug in passing into the cavity also has the effect of turning in any free edge or shreds of mucous membrane against the raw surface of the capsule. One end of the pack is left long enough to protrude through the suprapubic opening to facilitate its removal later. This is a most effective and simple method of providing against possible secondary hæmorrhage which is impossible when the pack has been properly placed. As the pack is entirely under your control it can be forced in tighter by drawing upon the urethral string or loosened by manipulating the suprapubic end. For this valuable procedure I am indebted to Professor Matas who taught me its use.

A drainage tube placed in the suprapubic opening and a few approximating sutures complete the operation.

The pack is removed in twenty four or forty eight hours when danger of hæmorrhage is past and the case is handled by the usual methods following these operations.

A notable feature is the absence of all shock or depression the pulse showing very little change after operation. Often there is not enough pain to justify a hypodermic. These cases are usually up in a chair in a few days and on their feet by the end of a week. The nourishment is usually restricted to liquids for the first day after which they are permitted to eat what their appetite calls for. Many cases operated by this method show absolutely no after-disturbance of any kind and feel as if they had not been operated at all.

A HÆMOSTATIC SAFETY PIN FOR USE IN CRANIAL SURGERY

By LOUIS FRIEDMAN M.D. New York

FOR the control of scalp hæmorrhage in cranial surgery a number of devices have been constructed viz some form of encircling tourniquet either of rubber or steel band as that of Landon's clamps, Kredel's hæmostatic suture the deep back stitch sutures or pins of the Makkas and Vorschütz type. The simple instrument which I present here for the control of scalp hæmorrhage can be used either in osteoplastic resection of the skull or for subtemporal decompression and is applicable to any region of the skull.

Figure 1 illustrates best the manner of its usage the larger pins being applied. Due to the convexity and irregular planes of the surface of the skull corners will be left uncontrolled by the larger pins. For these corners the smaller pins

(A) can be used. The pin applied at the upper margin of the ear controls the superficial temporal artery the main arterial supply in the temporoparietal region, so the main arterial trunks can be controlled either in the frontal or occipital regions.

In introducing the pin the bone should be closely hugged so as to include the entire thickness of the scalp. At the point of exit of the pin the scalp should be depressed with scissors or an artery clamp thus facilitating its exit and closure (Fig. 2). As the pin is closed like the ordinary safety pin and as the middle bar is controlled by two screws, it is sufficiently pressed against the scalp to control all bleeding. The pins should be introduced at least one-half to three-fourths inch from the proposed line of incision before the cut is made and should be left on until the scalp has been sutured and all visible vessels caught and tied. The pins are strong but light of construction the larger four and one-half the smaller two and one-half inches in length. They can be rapidly applied and control hæmorrhage sufficiently to give a bloodless field.

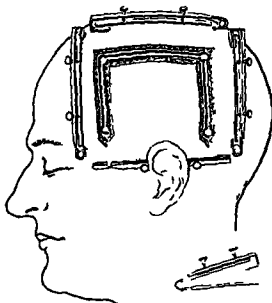


Fig. Friedman hæmostatic safety pin applied

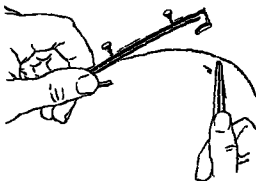


Fig. Illustration of controlling exit of pin

PLAITING THE ROUND LIGAMENTS

By SIDNEY FREEMAN WILCOX, M.D. F.A.C.S. NEW YORK

THE procedure which I present is a modification of or an addition to the one devised by Martin of Chicago and is performed as follows:

First any necessary vaginal and intra uterine work should be done and it should be ascertained that the uterus is free from adhesions and that there is no pelvic inflammation. Then the operator feels along the upper edge of the pubic bone on one side until he locates the spine. A vertical incision is made directly upward from this point about two inches in length.

When the tissues are cleared down to the

forceps and passed through the fat above the pubis and made to emerge in the other wound. Then releasing this ligament the other one is caught and drawn back alongside the first.

My addition to the operation begins here and consists of passing the small end of each ligament several times through the thick part of the other one—as is shown in the illustration—and to make the hold doubly sure the end of each ligament may be threaded back through itself. The two ligaments are then stitched together with a few sutures of ten-day chromicized catgut and the wound closed.



Fig. The rings closed and the ligaments each passed through the other and back through itself.

aponeurosis of the external oblique muscle a bunch of fat is seen projecting from the external ring. This contains the distal end of the round ligament. Picking it up in the forceps and slitting the fibers of the aponeurosis as far up as the internal ring the ligament may be separated from the surrounding fat and drawn out to its full length stripping back its peritoneal envelope as this is done. The other ligament should be treated in the same manner.

It can be ascertained when both ligaments are free by making traction first on one ligament and then on the other. If the ligaments have been entirely cleared of adhesions they can be drawn forward and backward like a rope over a pulley. When not working on the ligaments they should be kept warm and moist by wrapping them in gauze wet with warm saline solution.

The rings are closed with a continuous suture and for the slit in the fibrous aponeurosis I prefer a medium sized kangaroo-tendon thread. After the rings have been closed the distal end of one ligament is picked up in a pair of sharp-pointed

These sutures should pass parallel with the long axis of the ligament so that the circulation shall not be cut off.

The special advantages of this operation are:

1. The uterus is held in the forward position by its natural supports.

2. The ligaments enlarge normally during pregnancy and undergo normal involution after parturition. This has been demonstrated in several cases in my own practice.

3. The uterus is sustained in its normal relation to the abdominal wall by its ligaments which have been advanced in their attachments equivalent to shortening.

4. The abdomen is not opened unless one desires to do so. I have gone in through the right wound and removed the appendix on several occasions. If it should seem necessary one could follow the suggestion of Edebohl and pass a finger down into the pelvis and break up adhesions. Such a procedure would hardly be necessary if a careful previous examination had been made.

TUMOR OF THE CAROTID BODY

REPORT OF A CASE

BY CASA COLLIER M.D. MEMPHIS TENNESSEE

THE carotid body is a small structure generally about the size of a grain of rice situated in the bifurcation of the common carotid artery. The body was first described by Haller in 1743 and in 1861 Luschka wrote the first article dealing with its microscopic appearance. It is very intimately connected with the internal carotid and sometimes with the external or common carotid by the ligament of Mayer through which it receives an abundant blood and nerve supply. It is in intimate association with and receives communication from the cervical sympathetic, vagus, superior laryngeal and glossopharyngeal nerves. According to some anatomists it is more retrocarotid than intercarotid; that is, it is more behind the internal carotid than it is in the bifurcation. If one not familiar with the insignificant appearance of this body were to undertake to expose it by dissection the probability is that he would say that it was not present. In fact it is so difficult to detect that a great many observers have expressed the opinion that it is frequently absent but, as is pointed out by Funke, this is erroneous. It is not frequently absent but it frequently appears only as a slight thickening of the adventitia of the internal carotid close to the bifurcation. This little body has brought upon itself quite a little investigation as to its embryology and very few investigators agree definitely as to its origin. Paltauf, von Heinleth and Borst agree that it takes its origin from the connective tissue. Stilling and Kohn hold that it is of nervous origin and its parent is the embryonal ganglion cells of the intercarotid plexus.

Kaschenko, who is a zoologist and who has done extensive research in zoological fields, holds that it arises directly from the adventitia of the internal carotid artery where in the embryo it can be seen as such, and there it consists only of the loose connective tissue framework supporting frequent cell nests. Later the solid form develops from this. The view most generally supported is that of Zuckerkandl that these bodies arise from the sympathochromaffin system anlage which passes from the upper cervical sympathetic ganglion between the two carotids and that early in embryonic life this anlage buds off from the central nervous system.

Histologically the body consists of a capsule from which are sent down into the gland connective-tissue septa which divide and subdivide it into lobes and lobules and these lobules are filled with epithelioid cells with large nuclei and distinct chromatin structure. These cells lie close together and there is a direct transition from them to the endothelial cells lining the blood-vessels which permeate the whole gland, each lobule receiving a branch. The cells are very similar to those found in the suprarenal and coeliac glands in the abdominal sympathetic, and in the pituitary.

It has been held that these chromaffin cells are responsible for the function of the gland that they have an internal secretion and that their action is in conjunction with the hypophysis cerebri and suprarenals. Extracts of the gland, however, have given widely varying results when injected and so far nothing definite is reported. Mulon, using a watery extract, found that its action raises blood pressure and accelerates both the rate and force of the heart-beat, while Gomez obtained that there was a fall in blood pressure by using a glycerine extract.

Whatever the physiological action of the gland is, it is agreed by practically all investigators that its period of functional activity ceases at or soon after puberty and that the gland undergoes fibrous degeneration. If this degeneration does not take place the gland will enlarge. This enlargement is pathological and although it is exceedingly slow and may run a benign course over a number of years before it becomes noticeable it will in all probability eventually undergo a malignant evolution and the probability is that it is then too late for the patient to be cured as the operation is highly perilous. DeCosta, in his early discussion of the operation, says that he accepted as his surgical creed in regard to these tumors the one expressed by Keen that every operation undertaken for tumor of the carotid gland may require resection of the vessels and nerves of the neck. Interference should be undertaken therefore only when serious functional trouble or rapid evolution of an apparently malignant character is present, thus justifying an attempt the consequence of which may be very grave. Now however he has greatly changed his viewpoint and advocates

immediate removal if the gland is either visible or palpable as the chances for a cure are so much greater if the operation is undertaken while the tumor is small and before the malignancy occurs. With the exception of one epithelioma the tumors of this gland have been of the type of endotheliomata known as penthehoma. The secondary malignancy is always sarcomatous. No case has been encountered before the eighteenth year and it has favored slightly the female sex. With the exception of one bilateral case reported by DaCosta and one by Schmidt it has been unilateral and seems to prefer the left side.

Among the clinical manifestations the tumor alone is constant—rarely there is pain, pupillary irregularity, failure to react to light, hoarseness, dysphagia, headaches, and sometimes cardiac irregularity. Later there may be displacement of the larynx and paralysis of vocal cords.

The patient always presents herself on account of the tumor in the neck. This tumor lies high and presents anteriorly from under the sternocleidomastoid muscle. There is a history of very slow growth extending frequently over a period of four to ten years or longer. The mass is firm and is movable laterally but not vertically. Pulsation can be felt. This, however, with the exception of Dr. Lilienthal's case is not the expansile pulsation of an aneurysm. There is usually some difficulty in differentiating these tumors from other tumors that may present themselves in the same neighborhood such for instance as tuberculous lymphadenitis, branchial cysts, aneurysm, ectopic goiter, Hodgkin's disease, tumors in submanillary or parotid salivary gland, fibroma, lipoma, lymphosarcoma, and hygroma.

In the case that I have to report the patient, a woman of 50 years, presented herself for consultation concerning a tumor on the left side of her neck. This well-grown was first noticed about five years ago and has grown very slowly but very steadily ever since. It has given no pain other than could be attributed to the pressure of body of its size, sense of fullness, and the knowledge of its presence on the neck. There was no pupillary irregularity or other manifestations of pressure on involvement of the nerves. The pulsation in the temporal artery however, were very small when compared with those of the right. The tumor was firm and rather freely movable from side to side but seemed firmly fixed when an effort was made to move it vertically. A probable diagnosis of tumor of the carotid body was made and the patient was referred from the tumor location in the shadow the radiograph it was considered that the tumor might be the submanillary gland but operation was advised immediately. Under ether anesthesia incision was made over the tumor border and parallel to the sternocleidomastoid muscle. By blunt dissection the tumor was exposed with considerable difficulty and in the face of profuse hemorrhage. It had exactly

the feel and appearance of thyroid gland. The common carotid artery could be seen passing directly into the center of the lower pole and the external and internal emerging laterally near the top. The external carotid was ligated and cut the gland was then rotated for inspection and the effort to dissect it free from the common and internal carotids was early abandoned for fear of hemorrhage. The common carotid was then ligated below and the internal carotid above. They were cut and the tumor delivered. The wound was closed with a small gauze drain retained which was removed on the morning of the third day.

The patient lay beautifully from the anæsthetic—talked distinctly to the nurse and doctor and complained of no pain. During the afternoon of the second day she developed a mild degree of oedema of the larynx and considerable hoarseness. Dr. A. C. Lewis was called in and prescribed atropin and an adrenalin spray. The oedema gradually appeared but the hoarseness remained. The wound healed by first intention and the patient left the hospital on the sixteenth day. She suffered a paralysis of the left vocal cords, but her voice has improved considerably with the passage of time.

Pathological report. Tumor about the size and shape of large walnut. Dark reddish brown in color. Moderately dense fibrous capsule. C. section shows a delicate alveolar appearance. Microscopically sections stained with hematoxylin and eosin show an alveolar network of very cellular connective tissue, supporting a large number of capillary vessels, the walls of which are rather thick. The alveoli are filled with moderately large cells containing abundant protoplasm and having medium-sized nucleus which stain well. The cells; the alveoli are apparently closely connected with the capillaries.

Diagnosis. Penthehoma.

Addendum. Since this patient was operated the 4th of August, 1904 she has been under constant observation. Her voice improved gradually and at the present time she has her normal voice.

I wish here to express my indebtedness to Dr. J. C. Ayers who assisted me in the operation and was associated with me in the after-treatment also to Dr. A. C. Lewis who was consulted in regard to the laryngeal oedema and to Dr. Jesse J. Cullings whose pathological report is given above.

I lay no claim to the originality of this article. It is largely a résumé of the literature the bibliography of which is appended.

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the dura showed it to be uninjured no pressure from speculae of bone n blood The dura was opened findings egati c.

There was no improvement after operation and the patient died on the seventh day

N autopsy was allowed other than the examination of the cord Several inches of this covered with the dura were removed Absolutely no jury to dura or cord could be seen until after the p mater was opened

The condition was so typical of that described by O'Reilly in his Surgery that I shall give it a full

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He says Destruction of the cord may occur as the result of transmission of energy from a missile of high velocity passing near the cord This shattering of the cord by molecular vibration has been noted by all observers as the result of the use of the modern high velocity projectile It has occurred in cases where the bullet barely grazed the membranes of the cord

The cord is reduced for some extent to a custard like material and is as completely and permanently destroyed as though it had been severed by a mallet

In this case it could not be seen that the membranes had been even grazed

A SIMPLE METHOD OF ESTABLISHING VAGINAL DRAINAGE

By JAMES C WOOD M.D. F.A.C.S. CLEVELAND, OHIO

ALL abdominal surgeons must have experienced at times a certain degree of difficulty in establishing vaginal drainage when it is deemed necessary after dealing from above with septic conditions within the pelvis or the abdomen It is not always an easy matter even under the most favorable conditions to get into the vagina from above To make a vaginal puncture it is ordinarily necessary to disarrange the aseptic facts and to provide an extra sterile assistant to conduct by the sense of touch the perforating forceps into the posterior vaginal fornix in case the extra assistant is not available the surgeon is compelled to change his gloves and gown after he himself has carried the forceps into the vagina To overcome this the writer has for some time been using a technique which has greatly simplified the procedure Indeed the technique is so simple that it is more than probable that many other surgeons have used the same method I have however never seen it described in print

I had my instrument dealer convert a large sized full curved Pean forceps into a trocar pointed instrument with a hole drilled transversely through its tip large enough to care for a medium size catgut ligature When it is probable that vaginal drainage will be required

the vagina is sterilized and all necessary work from below completed A short full curved needle with a No. 0 plain catgut is carried through the mucosa of the posterior fornix at a point where the cul-de-sac of Douglas can be most easily and safely penetrated This ligature is now carried through the opening in the tip of the forceps and firmly tied the point of the instrument being thus held in close proximity to the mucous membrane in the posterior fornix by a ligature easily broken

The forceps should be long enough to project some six or eight inches from the vaginal ostium The catgut is only strong enough to hold the instrument in position while the work from above is being completed After its completion and under the eye and touch of the operator a nurse who need not necessarily be sterile is instructed to pass her hand under the protective sheets from below force the blades of the instrument into the cul-de-sac of Douglas and expand them so as to make the vaginal opening large enough to draw into the vagina a trip of gauze or a drainage tube as the case may require In case drainage from below is not deemed advisable the forceps can be easily withdrawn without the least danger of disturbing the uterus providing a No. 0 or a No. 00 catgut is used

A PRACTICAL OBSTETRICAL BED

By FLETCHER CARY, M.D. CHICAGO

THERE has been a long felt need of an obstetrical bed that would be practical for the obstetrician and at the same time comfortable to the patient. We have all had the experience many times of delivering a

metal. This frame is hung in such a manner that it fits just inside the regular frame of the bed and when in place lies snugly against the under side of the bed springs. To facilitate raising and lowering this under frame its upper

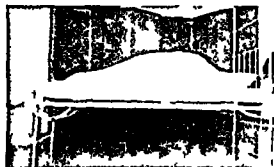


Fig. 1. Bed before lowering under-frame

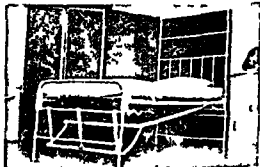


Fig. 2. Under frame lowered, showing raising and lowering device

patient in a sagging bed. Also we have often heard patients in hospitals complain bitterly of the hard tables upon which they were compelled to lie.

It would seem that the ideal bed for delivery would be one which is comfortable and at the same time easily convertible into an operating table. Such a bed designed by Dr. Frank Cary has been in use for several years in the obstetrical department of St. Luke's Hospital. I append photographs of the bed.

It is as comfortable as any bed and can be made flat and firm securing a maximum of comfort for the patient and a minimum of disadvantage to the operator.

The bed is a regular hospital bed having in addition a steel under frame covered with sheet

and is hinged to the legs at the head of the bed its lower end being manipulated by three straps which wind up on a roller by means of a crank. A ratchet keeps the latter from slipping. The original design contemplated a mechanical device for raising and lowering the steel table but was abandoned in favor of the cheaper method.

A patient lying on this bed is perfectly comfortable and would not realize that the bed is different from the regular hospital bed since the under table is not yet raised. As the time for delivery approaches the steel table is elevated converting the comfortable bed into a practical operating table.

We have used this bed in hospital practice for the past five years and have found it most satisfactory.

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD JANUARY 15 1915 WITH THE PRESIDENT DR ROBERT T GILMORE
IN THE CHAIR

A CASE OF SPASTIC PARAPLEGIA AND BIRTH THE PARAPLEGIA SUBSEQUENTLY OPERATED AND CURED

DR N SPROAT HEANLY DR DEAN LEWIS and
DR PETER RASTOF reported this case jointly
DR HEANLY in reporting the case said

This patient was admitted to the Presbyterian
hospital on January 22 1912 She was 21 years of
age and was married in June 1911 She had but
one menstrual period after marriage She had
always been well and had gained several pounds
in weight from the time of marriage until she was
admitted to the hospital

She gave the following history Six weeks ago she
began to notice a feeling of numbness in the toes of
the right foot The numbness appeared on the
opposite side and became more extensive When
she was admitted to the hospital she was completely
paralyzed in both lower extremities She had a
well developed spastic paraplegia The feet were
drawn up the knees were flexed and she could not
stretch out the legs She had some muscle sense
but no sensatio and motion were obliterated
She was about seven months pregnant

The X ray plates which Dr Lewis will present to
you show a softening of the body of the fifth dorsal
vertebra

Several questions arose as to what to do whether
to let her go on with the pregnancy and, if so
whether birth would occur at term or whether she
would probably go over term

From our knowledge I reported cases and from
animal experimentation it is known that connection
with the brain is not necessary for the maintenance
of pregnancy or for the timely onset of labor
If first stage is normal the use of paraly-
tics in the abdominal muscles expulsive efforts are in
balance so that the second stage is prolonged
The balance is usually defective in preg-
nancy so that anxious processes in teeth or bones
are usually paid in the progress which fact
precludes plans why the course of the paralysis
was as plain her case

She was able to feel fetal movements during
pregnancy and all to empty the bladder and
bowel although the reflexes were difficult to start
The birth was due March 10 On the first of
April he went into labor and the labor was practi-

cally painless The patient had a bearing down
sensation and a sense of pressure in the abdomen
After three and a half hours of labor the membranes
ruptured effacement being complete and the cervix
being about the size of a half dollar Twelve hours
later the head rested on the perineum The patient
then made no progress and was tired out so she was
given a hypodermic of one quarter grain of morphine
which gave her 4 hours rest Pains again returned
and the patient constantly had a desire to defecate
No progress was made and the patient could not
bear down After 24 hours of labor the fetal
heart tones went up to 170 and meconium began
to pass The patient was taken to the clinic and
Dr Webster applied low forceps. No anesthetic
was required She felt the forceps being applied but
had no pain although she complained of a dis-
agreeable stretching sensation during the easy ex-
traction of the child which was a boy weighing six
pounds and thirteen ounces The puerperium was
normal She nursed the baby and it gained rapidly
in weight The third week after delivery Dr Lewis
took the case in hand and did a laminectomy with
the final result that the patient is in full health is
able to work and has no paralysis

This case is interesting because of the complete
restoration of function after laminectomy and be-
cause of the physiological questions brought up con-
cerning birth under condition of separation of the
cerebrum from the lower portion of the cord

DR DEAN D LEWIS The X ray picture reveals
a peculiar lesion It is not exactly that of tuber-
culosis for the bodies of the vertebrae are not de-
stroyed The lesion at the level of the fifth and sixth
dorsal vertebrae appears to be a definite perosis
with new bone formation, but not associated with
much destruction There is no gibbus On account
of the definite X ray findings and the paraplegia a
decompressive laminectomy was performed three
laminae being removed Within the cord was ex-
posed a rather extensive definite pachymeningitis
was found Believing that the lesion was probably
tuberculous the dura was not opened for fear of
a tuberculous leptomeningitis might develop The
laminae were removed and the cord freed
from pressure The return of sensation was rapid
a definite sensory return being noted within forty
eight hours In ten days there was a definite return

of motion in the toes. The improvement has been progressive until at the present time the patient is practically normal. I believe that a syphilitic lesion can be ruled out in this case. The Wassermann was negative and no antisyphilitic treatment was instituted.

THREE CASES OF PAPILLARY CYSTADENOMA

DR WILLIAM M. THOMPSON. I wish to report briefly three cases of papillary cystadenoma. It is rather unique for one to come across three such cases so close together, each one representing a variation in the form of a papillary cystadenoma.

The first is a small growth evidently a protrusion from the ovary and growing simply as a warty tumor. The appearance of this is similar to condylomata but it had no metastasis in the pelvis. I expected to find metastasis somewhere but found none in this case even with the papilloma outside of the ovary for some time.

The other one is exactly the opposite type. The interior of the cyst is lined with the papillae and it was filled with pseudomucin or gelatinous cysts as the English call them and was not ruptured. There was no metastasis in the abdomen in this case.

I will pass these cysts around so that you can compare them. These were two simple cases, one in which all of the papillae seemed outside of the ovary and yet there was no metastasis and no evidence of blocking of the endothelium and ascites in the abdomen that usually occurs in these cases.

The third case was operated a few weeks ago and the cyst removed was so large that I brought only a part of it. I am sorry I have not the whole cyst because it is the most unusual tumor of the kind I have ever seen. You see it is a typical gelatinous cyst which ruptured through this opening evidently not by a protrusion of papillae but from thinning of the membrane. The membranes in these cysts are very thin and break readily. The loculi break into each other. The cyst ruptured and turned wrong side out and enough of the small cysts remained so that there was a large tumor and the abdomen was full of this gelatinous fluid. This woman was forty-five years of age and unmarried. She had curious heart symptoms which resembled very much the heart symptoms of a myoma. When I first examined her I also examined the heart and thought of a myoma. Doubtless you have all read papers and discussions on the literature recently on heart trouble in myomatous disease of the uterus. I naturally thought of myoma but when I looked at the abdomen it was broad. It was not hard nor as resistant as in a case of myoma. The flanks were dull. The dullness extended up around the liver. This dullness did not change as the patient sat up as it would in ascites.

Having seen two other cases similar to this I concluded it was some kind of pseudomucinous cyst but I had no idea it had ruptured to such an extent. When the cyst was removed it was not

possible to take away all of this gelatinous substance. The abdomen was full of it. As you all know the substance does not confine itself to the pelvis a fluid ordinarily does. It is not governed by the force of gravity but it gets up under the liver about the spleen in the region of the stomach and underneath the omentum. I scooped out handfuls of it. The question arose as to what to do whether as some surgeons suggest to dissolve this with salt solution which is the solvent recommended or let it alone. I was much afraid of infection and so I closed the abdomen without endeavoring to wash it out. I scooped out as much as I could before closing the abdomen. The patient has since had thrombophlebitis on both sides.

DR A. BELCHAM KEYES. This is an extremely interesting variety of the ovarian cystomata. The first type of cystadenoma that we generally think of is the one which may grow to very large size the cystadenoma pseudomucinosum usually of the evertens type less often as in two of these exhibited by Dr. Thompson of the papillary or invertens type. These tumors if the loculi rupture never cause any growth upon the peritoneal surface and comparatively rarely undergo malignant degeneration. The cystadenoma (invertens) serosum with serous contents—the ovarian papillomata of the old authors—now termed serosum is not represented in this exhibit. They almost always cause papillary growths upon the peritoneal surface and are very prone to carcinomatous degeneration. Complete recovery in these cases after removal is much less frequent. The cystadenoma serosum is said usually to grow from the hilus cells of the ovary which are sometimes ciliated.

Pozzi of Paris read a paper at a joint meeting of the Chicago Medical and Chicago Gynecological Society on this subject and received a great deal of adverse criticism for saying that the prognosis was better if much care was exercised in removing all peritoneal growths also. In a talk with Angel I even advised not to observe the rule to remove the apparently healthy ovary if the other side of the woman is in the reproductive period and desirous of bearing children. I have recently heard from two patients from whom I removed this type of tumor with removal of a tense peritoneal growth. They have been perfectly well since the operation 10 years ago. The others have all died.

As for the very rare and interesting gelatinous tumor exhibited here tonight by Dr. Thompson—cystadenoma pseudomucinosum composed of a Wharton jelly like material which grows readily upon the peritoneal surface—if the loculi rupture Dr. Thompson will probably have to reopen the abdomen of this patient in 3 or 4 years to remove the reaccumulation on the peritoneal surface. Dr. Hecroten and I had one case in which we had to reopen the patient. Other than the reaccumulation of the gelatinous material they do not appear to be malignant.

I am sorry I did not know that these tumors were

going to be shown or I would have brought some sections of all kinds with me

I have never before seen but one case of the pseudomyxomatous kind of tumor

Dr Thompson deserves the congratulation of the Society

DR DEAN D LEWIS Pseudomyxomatous peritonitis is always of considerable interest. It or closely allied conditions may occasionally develop from lesions which do not resemble each other closely. A little over a year ago I operated upon a woman for a supposed ovarian cyst. After I had delivered and had removed the tumor after having clamped the pedicle I found that I had removed part of the cecum. The lesion was an enormous mucocele of the appendix. I later heard of a case in which a surgeon had operated upon an obscure lesion of the abdomen and had found a condition resembling a pseudomyxomatous peritonitis. In looking over the abdomen he found a mucocele of the appendix which had ruptured. Thinking that he was dealing with a colloid carcinoma of the peritoneum he closed the abdomen expecting the patient to die. Improvement was immediately noted. The condition within the abdomen improved and the patient made an uninterrupted recovery. This peculiar condition within the abdomen evidently followed rupture of the mucocele.

DR THOMPSON I want to thank Dr. Keyes for his remarks on the pathology of these cysts. The pathology as given in our textbooks is very vague. It is very essential to make a distinction between the malignant and non malignant types of these tumors.

Last year I operated on a woman three times who had a papillary cystadenoma malignum as some authors call it. We worked that case out carefully. Dr. Dick did the pathological work. There were metastases found in the second and third operations. In that tumor there was in addition to a carcinomatous area a fully developed dermoid. Dermoid is frequently found in these cases.

THREE CASES OF ABNORMAL DEVELOPMENT OF THE FEMALE GENITALIA

DR MARY T. GOLDSTINE Last spring I reported to the Society three cases under this heading. To night I want to add three more making a series of six cases of abnormal development of the genitalia inside of sixteen months.

CASE 1: Mr. M. D. Summit, Illinois, aged 23, married two years. Menstruation began at thirteen, twenty-eight day type, lasting three to four days, copious flow, last menstruation first week of March, 1914. Patient consulted a physician in May, six weeks after missing her period. This doctor dilated the uterus. Seven weeks later the patient went to another doctor who did a curettage to get rid of supposed retained products of conception. He however did not find any. Patient entered the hospital July 9, 1914. For the last month she noticed a mass forming on the left side

which is growing larger. Considerable pain in lumbar and sacral region for the last six weeks, which is worse on standing. There was a slight flowing for a few days after curettage.

Examination showed the external genitals normal, vagina divided in half by a strong septum, left vagina a blind pouch, right vagina contained a large cervix. Bimanual examination disclosed a large mass about the size of a four months pregnancy. On the left side there was a small mass which resembled the uterus on the right. Both were distinctly separated.

Laparotomy showed an apparently normal uterus with its tube and ovary on the right, the mass on the left had its origin from the upper part of the cervix of the right uterus and resembled a pregnant fundus in every detail. The left tube and ovary were attached to this mass. This accessory fundus was removed and contained the products of a four to four and one half months conception. Subsequent examination showed the cervical canal of the uterus on the right side to be intact.

CASE 2: The second case was one of salpingitis. Nothing out of the ordinary in the history. The girl was twenty years of age. Examination revealed a double mass in the pelvic region for which a laparotomy was done. Patient has a double pyosalpinx. The uterus on the left was normal in size and shape, on the right separated from the left uterus about one and one half inches. Was another immaturely developed uterus minus the cervix and connected with the left uterus by a tube which opened into both uteri. Attached to the right uterus was the ovary and tube of that side. The appendix was removed and was about two and one half inches long and indurated for about an inch from the tip downward. Sections showed an endothelioma of the appendix.

CASE 3: Miss C, aged 22. Never menstruated, always enjoyed good health. Examination showed the external genitals apparently normal. Urethra opening in normal position. Anus in normal position. Absence of vagina or vaginal opening. Laparotomy showed an absence of the uterus, left tube and ovary and left broad ligament, about one-half of the right tube and normal right ovary attached to a small fold of broad ligament to the extreme right of the pelvis. Bladder apparently normal.

CASE 4: The fourth case is an unusual one of extra-uterine pregnancy. The specimen shows how large a tube can develop before primary rupture. It is rather an unusual specimen.

DR HENRY T. LEWIS There is very little that can be added to the teratological aspects of these cases because the author has said about all that there is to say.

In those cases where we get a small infantile uterus it is interesting to see the effect of sexual stimulus upon it. I have in mind a case that came under my observation several years ago. The patient a woman about thirty had never menstruated. She came to be examined for that reason.

I found a very small uterus which one could barely feel. She married and began to menstruate in the course of a few months. Finally she began to have vesical and pelvic symptoms which led her to think she might be pregnant. Instead of a pregnancy I found she had a fibroid tumor. The uterus was as large as a fist. She has not yet consented to operation.

DR HENRY F. LEWIS. What are we to do in a case in which we discover pregnancy in a well developed horn of a bicornate uterus? I ask this because I really was present at an operation where the question of procedure arose. I believe that we had best close the abdomen if the horns are well developed. That women under such circumstances bear children with no difficulty and without the condition being even suspected is undoubtedly a fact. Once when assisting Dr. Webster he operated upon a woman for double pyosalpinx who had given birth to three or four children without difficulty. She had a bicornate uterus and each horn had apparently gone through pregnancies. Of course occasionally the hypertrophied non-pregnant horn gets in the way and obstructs the birth canal at labor but is this frequent enough to justify operating upon a pregnant bicornate uterus if the horns are well developed? If either horn is removed the scar weakens the lower uterine segment of the remaining horn so that the chance of rupture at the time of labor becomes quite a probable thing.

DR W. A. DENMAN DORLAND. The second case reported by Dr. Goldstone, namely absence of the uterus with the presence of one ovary brings up an interesting thought. In all probability those women who have these rudimentary ovaries or fragments of ovaries with absence of the uterus and vagina retain their feminine traits because of that fact.

I recall an Italian girl quite a well developed woman married twenty-one years of age who was brought into my clinic at the Pennsylvania Hospital by her husband to find out why he could not have proper relations with his wife. That woman was well developed in every respect save that she had no uterus. The vagina was infantile just large enough to admit the tip of my index finger. Subsequently she underwent a laparotomy and then it was found that she had on both sides rudimentary ovaries but no uterus. There were simply fragments of ovarian tissue. She had the feminine traits. Subsequently I saw at the Polytechnic Hospital another case of absence of organs with a vagina so small as barely to admit my thumb. This woman had a remarkable growth of hair upon the lips, and while she had a feminine voice when she spoke when she laughed it became decidedly masculine. An operation was done on her afterwards for some trouble in her appendix or intestine. Dr. Slocum who operated found no uterus and no ovarian tissue.

DR THOMPSON. I would like to ask if women with bicornate uterus are more prone to miscarriage. I know of one case where a woman miscarried twice

and the last time I tried to get control of her I was going to take her to the hospital, but she got away from me.

DR THOMAS J. DOEDERLEIN. Perhaps it would be opportune to recall a case I once reported to the Society of pregnancy in an adenomyoma which occurred in the practice of von Recklinghausen. It was an unique case and we called it then a new type of ectopic pregnancy. No other case had been observed before and since Dr. Thompson referred to the possibility of miscarriage in such cases I will say that in this case there was evidently a breaking down of the adenomyoma. The center of the adenomyoma had broken into the uterus and through the fistulous tract the fertilized ovum had developed in the lenomyoma with a subsequent miscarriage at a period of about four months. Dr. Herzog and I investigated that case to see whether we were right. Some called it interstitial pregnancy or pregnancy in Gartner's duct. Our investigation and subsequent examination disclosed beyond a doubt that it was a pregnancy in an adenomyoma. This class of cases of ectopic pregnancy—to which all these pregnancies of the bicornate variety belong—certainly comprise most unique cases.

DR COLDFEATHER. We debated whether or not to let pregnancy go on knowing it would be inevitably caesarean section as I did not see how she could be delivered normally with the cervix pointing in the direction described. Subsequent examination showed the vaginal canal intact. The fundus lay against the pelvic wall.

DR HENRY F. LEWIS. What was the condition of the tube on the pregnant side?

DR COLDFEATHER. The tube and ovary were normal. It was a case such as I reported last year where I had a double uterus, double vagina and cervix and that woman had normal delivery from her uterus and is menstruating normally today.

EXPERIMENTS ON THE PRODUCTION OF THERAPEUTIC ABORTION AND LABOR AT TERM

DR ARTHUR HALE CURTIS. reported rather briefly some experiments which he has been doing on the production of therapeutic abortion and labor at term through the use of placental extract.

EMPHANIASIS OF BOTH LOWER EXTREMITIES

DR ROBERT T. GILLMORE. reported a case of elephantiasis admitted to Wesley Hospital January 22, 1914.

Mrs. X, age 37, native of West Virginia. The patient was born in a healthful farming country and remained there up to three and one-half years ago. Family history negative except father who was said to be scrofulous. Patient was nursed at mother's breast for two or three months and then brought up on cow's milk. Patient says that she has had lumps under the skin on each side of the vulva since infancy. When she first remembers them they

were about the size of hazelnuts round and as hard as her cervical glands are at present. The glands were movable under the skin and during her childhood they caused no discomfort unless they were rubbed which would cause them to become tender. There was no soreness or swelling of the vulva and no vaginal discharge. These swellings gradually increased in size the one on the right side to the size of a hen's egg while that on the left scarcely increased. The maximum size was reached about the time she began to menstruate at 17 years of age.

Menstruation She began to menstruate at 17 years of age and this first menstruation and those for about three years afterward were accompanied by chills and fever. These symptoms gradually decreased in intensity until they ceased altogether. She would be in excellent health until the onset of her period when she would have a severe chill which usually occurred at night and lasted about two hours and she would be compelled to remain in bed. This chill would be followed by a high temperature and profuse perspiration. The following day she would be so weak that she was obliged to keep her bed. In about 24 hours another chill with accompanying fever and perspiration would repeat itself. This would be repeated every 24 hours until the menstrual flow was established. The community in which she lived was not marshy and to her knowledge there were no cases of ague.

Symptoms after menstruation After having a chill she would suffer with pain across the upper part of the lumbar region and with frequent urination. All these symptoms ceased with the cessation of the chills and fever three years afterward.

Physical condition after menstruation With the establishment of her menstruation the patient observed a gradual swelling of the right lower extremity. The year following the left lower extremity began to increase in size. There was never any swelling in any other part of the body. This enlargement neither ascended nor descended the swelling seemed to be general from the hips to the ankle. It was at first soft pitting on pressure gradually becoming more boggy. During the chills she frequently observed that the skin became red but this condition soon disappeared, leaving the legs and thighs aching and sore with the skin painful to touch. Following the fever the skin would peel and the surface become raw. It is possible that this local irritation was due to a chloroform lumbric which she used freely at such times. During the above mentioned paroxysms the right leg would become so painful that it would become involuntarily drawn upon her thigh. There were no pains in the joint.

Present history Of late she has developed a throbbing pain in the knee of the nature of a toothache which gradually wears away. Her joints were never swollen. She was never troubled with neuralgia in her leg. Her foot has never been

painful or swollen. With the increase of the size of the lower extremity the surface has become harder this hardness markedly increased for five years since which time it has been stationary. At the present time this limb causes her no pain it becomes tired when it is used it does not become cold and it does not become softened to feel when elevated. There are no ulcers. She can stand up all day with no discomfort except a tired feeling and the throbbing pain in the knee.



Fig 1. D. Gilmore's case of elephantiasis of both lower extremities.

The left lower extremity began to enlarge about one year after the right. After two or three periods it was about the same size as the right and has seemingly remained stationary.

Examination of heart negative of lungs negative, Wassermann, positive.

Blood examination. Repeated attempts were made to find the *filaria sanguinis hominis* both at night while the patient was resting, and during the day with negative results. Red blood count 4,216,000 white blood count 6,400 differential lymphocytes 20 per cent polymorphonuclear 80 per cent hemoglobin 8 per cent urinalysis, negative. During her stay in the hospital the temperature frequently went as high as 99.8° and twice it reached 100°. The pulse during the afebrile period was 72.

During the high temperature the pulse rate was from about 95 to 100.

Dr GILMORE (after exhibiting the patient and reading the history of the case) This case seems to be one of the non filarial forms of elephantiasis. There are a great many causes given for this condition outside of filaria when it does not occur in tropical countries. The disease is more or less epidemic in those countries but in this country we do not find it so frequently. Syphilis has been mentioned as a cause by some authors also traumatism and especially streptococcal infection which is found in some cases.

In regard to the treatment at present we are treating this woman for syphilis and as long as she is able to go about and attend to her household duties as she is, there does not seem to be any definite indication for operation. She is suffering from no great disability. She does her work cheerfully and the disease does not seem to depress her.

We can find no areas of anesthesia. There is no hypersensitiveness due to the nerves not being involved in the pathological process. There is no breaking of the skin and there is no way of getting any secretion in which one might find filaria without operating. We might remove a portion of the tissue but owing to the lymphatics being more or less involved the reparative process would be interfered with, and I do not think we are justified in removing a piece for diagnosis at present.

Dr DEAN D LEWIS Is it not possible that these attacks may be due to a recurring lymphangitis and not to the application of chloroform liniment?

Dr GILMORE I do not know but it might be the cause of the irritation of the skin.

Dr LEWIS We see these cases associated with inguinal lymphadenitis and after operations for removal of diseased glands. I have a patient in the hospital with a marked lymphedema of the right lower extremity. He has had recurrent attacks of lymphangitis, accompanied by a general reaction and marked redness of the skin. It is rather common to see elephantiasis following removal of inguinal lymph nodes for suppurating buboes.

Heretofore we have regarded these cases as practically hopeless when as a matter of fact we might have done something for them. I do not think that Hardley's operation promises much. Kondoleon devised an operation which has given some relief and should be tried. The deep fascia of the thigh and leg offers a distinct barrier between the superficial and deep lymphatics and

the operation devised by Kondoleon consists of removing a piece of the deep fascia, so that the subcutaneous lymphatics may come in contact with those of the muscles with the idea of forming an anastomosis. In some cases strips have been made of the fascia and these have been run from the subcutaneous tissues into the muscles in an attempt to form new lymphatic channels.

Dr FRANK A STAHL I would like to ask Dr Lewis the philosophy of the Kondoleon operation.

Dr LEWIS The operation is done for the purpose of establishing circulation between the deep and superficial lymphatics.

Dr STAHL In a line with my question to Dr Lewis there seems to me here in the clinical picture of the patient a suggestion as to a favorable line of treatment. We notice comparatively speaking a small sized slipper projecting from the skirt line with no evidence of an unusual enlargement. Removing slipper and stocking we see a characteristic well marked elephantiasis of the whole limb from the dorsum of the foot upwards. About the foot is a well-defined compression ring outlining the rim of the slipper. At this ring the elephantiasis seems limited increasing from here upward and ceasing downward. This slipper ring apparently limits the growth by compression, which is similar in philosophy to the compression check resulting in the Chinese foot. Herein may be a suggestion in therapeutics from Nature. As from the slipper a long continued permanent inhibitory pressure might cause compression atrophy as by means of an elastic stocking at times supplemented by a general or local bandage as suggested by the local condition of the patient. Pressure is suggested in all works here we have a well marked hint from her slipper.

Dr GILMORE (closing) This patient while in the hospital, had a few exacerbations of fever from no apparent cause. Her temperature went up to 100° and pulse to 90 on three different occasions. It frequently went up to 99 and it was probably due to lymphangitis.

Treatment The question in regard to pressure has been tried by several observers. Authorities do not speak of it very favorably although it will do no harm.

In regard to the operation of Kondoleon I think eventually it should be tried on her operating on the right leg first for the purpose of establishing a circulation between the superficial and deep lymphatics.

JOINT MEETING OF THE CHICAGO SURGICAL AND THE CHICAGO PATHOLOGICAL SOCIETIES

HELD JANUARY 8 1915 WITH THE PRESIDENT OF THE CHICAGO SURGICAL SOCIETY
DR DANIEL N EISENDRATH IN THE CHAIR

SARCOMA OF THE SCIATIC NERVE

DR COLEMAN G BUFORD reported a case of Sarcoma of the Sciatic Nerve and exhibited the patient. This report will appear later

DR THOMAS A DAVIS I wish to report on this same case at an earlier stage Dr Buford's statements of the clinical history of the case are in accordance with the history I obtained

I made the diagnosis of fibrosarcoma with the knowledge that the fibrosarcomata rarely grew larger than a hickory nut although this tumor was as large as an egg In consequence of its large size together with the history of the case I thought it might be sarcoma and I removed the tumor

I wish to call attention to this growth which is apparently different physically from the one which Dr Buford shows I have a smooth globular-shaped tumor which shelled out of its capsule in the split nerve like a pea out of its pod When I incised it I found a softened area in the center which led me to change to the positive diagnosis of fibrosarcoma essentially a sarcoma I advised a more radical operation when the diagnosis was confirmed by Drs Melford and Long in their laboratory report The tissues in Dr Buford's specimen both macroscopic and microscopic, are those of a sarcoma while the tissue in my specimen shows the characteristics of a fibroma—smooth hard round and under the microscope you will see the wavy bundles of fibrous tissue throughout excepting at the border of softening or degeneration where the polymorphous cells predominate As I have said I advised the patient to undergo a more radical operation but he disappeared from the clinic

I saw the patient a few weeks later He had been to the Cook County Hospital where an amputation of the hip-joint was advised I believed that hip amputation offered the only promise because the soft tissues far from the nerve seemed invaded by the tumor and thus occurred in the advice

DR ARTHUR DEAN BEVAN I have knowledge of two similar cases one in my own practice and one in that of Dr Mackenzie of Portland Oregon

The resulting condition as seen in this patient is interesting and somewhat surprising and yet when you analyze the facts it is what you might expect with a putting out of function of the sciatic nerve the rest of the limb being supplied by the lumbar plexus and the motion and sensation that the patient has coming from the lumbar plexus He is in exactly the condition my patient was immediately after operation at which a large tumor was removed from the sciatic nerve and is walking surprisingly well

Dr Buford referred to the sensation on the inner side of the leg Of course that is from the lumbar plexus from the internal saphenous nerve The function is just what you have from the lumbar plexus itself

I have this suggestion to make that instead of a hip amputation in a case of this kind one might be very well satisfied with a very radical extirpation of the tumor without attempting to repair the sciatic nerve depending upon the motor function from the lumbar plexus with an arthrodesis of the ankle-joint That would give the patient a very useful limb The quadriceps extensor receives its nerve supply from the lumbar plexus and controls the knee fairly well as far as extension is concerned The hamstrings receive their nerve supply from the sciatic above the line of division and with an arthrodesis of the ankle-joint the patient would have a very useful limb At the same time one could do an extensive radical operation

DR BUFORD I would like to ask Dr Bevan whether he has made any effort at nerve-grafting or filling in the gap?

DR BEVAN Yes

DR BUFORD Did you have any luck?

DR BEVAN No There was a good case reported by Mackenzie four years ago in the *Transactions of the American Surgical Association* in which he resorted to extensive grafting

EXPERIMENTAL OBSERVATIONS ON THROMBOSIS AND EMBOLISM

DR ANGUS McLEAN Detroit Michigan read a paper by invitation entitled "Experimental Observations on Thrombosis and Embolism" (See p 457)

BACTERIOLOGY OF VASCULAR INFECTIONS

Dr F C ROSENOW read a paper entitled *Bacteriology of Vascular Infections* (See p 403)

SURGICAL IMPORTANCE OF INFECTIONS WITHIN THE VASCULAR SYSTEM

Dr JOHN D MURPHY followed with a paper entitled *Surgical Importance of Infections within the Vascular System*

These three papers were discussed jointly

DISCUSSION

Dr ARTHUR DICK REYER: I was much interested in Dr McLean's experiments especially the definite fact that an aseptic thread would not produce coagulation of the blood in the vein that with the added factor of pus organisms these blood-clots were constantly produced. I think that has an important practical bearing. It is a very simple practical bit of evidence which he has presented to us. I want to say a word or two about that one thing which bears it out and that is this: I have in probably a dozen or more cases now introduced a large amount of wire into abdominal thoracic aortic aneurysms and have never been able to produce anything like a large blood clot even with the added use of the electric current. I take it that my wire was aseptic. That is a simple bit of evidence in keeping with Dr McLean's experiments.

I am very much impressed by the work that Dr Rosenow is doing and particularly with the work he has presented to us tonight. I think it is going to make very much clearer many infections which before have appeared very dark to us. As I said at a recent meeting before the Surgical Society in a discussion on duodenal and gastric ulcer I believe the time will come when the etiology of duodenal ulcer will be quite as clear to us as we think the etiology of osteomyelitis is today.

One practical word in regard to the value of the work in post-operative thrombus. I think we can accept the proposition that a post-operative thrombus is an evidence of infection. It is not altogether simple. I do not think we can satisfy ourselves with the mere statement that it means infection and that alone because as Dr Rosenow tells us there are hundreds of cases where infection will persist for weeks and no thrombus develop. I am speaking now to the surgical members of this gathering. In such a discussion as we have heard tonight on thrombosis I think we should accept the fact that we have in a thrombus the possible evidence of in-

fection in spite of the fact that in most of these cases they occurred in what seemed to be clean cases surgically.

I believe it should lead us to greater refinements in our technique for one thing, and in the other to attempt to exclude every source of infection if possible before the patient is operated on. That is the moral that surgeons must be taught from the great bit of evidence that post-operative thrombi are infections.

Dr M L HARRIS: I have been especially interested in what Dr Rosenow has said regarding the elective action of the bacteria which he has cultivated from these various lesions. There is one fact which I obtained from his figures which is of interest and shows that all of the organisms still have a common affinity if we may so express the term and that the elective affinity must be something very recently acquired and easily lost. If we will look at these figures and add them up we find he has injected 301 animals with the organisms which he isolated from the various regions and injected both immediately and later and we find of 301 animals there were 247 with lesions of the heart and joints, showing that more than 80 per cent of the cases had the heart and joint affected so that all of these organisms have a common elective affinity for these particular regions and that the special affinity must have been something recent and of late formation. As to the cause of that I do not know. It is purely speculation until we can have further light from the remarkable work which Dr Rosenow is doing. But that fact is interesting enough to present.

Dr AUGUS McLEAN (closing the discussion on his part): We believe that in order to have these thrombi develop, an abnormal condition of the blood must be present; that is, if you injure the intima of a vein and the circulating blood is absolutely normal you will not get a thrombus. If on the other hand there is a toxin or some infection present a thrombus might form at the point of injury the injury being as it were the selective point for that toxin or bacterium to cause the formation of the thrombus. In all old cases where you have had a long continued focus of infection you will always find bacteria or their toxins circulating in the blood upon which the thrombus formation essentially depends.

Injury to the intima of a vessel is not always necessary for the production of a thrombus. If injury were an essential factor then thrombi ought not to form in the lateral sinus either before or after mastoid operation. Here there is no injury of the vessel the infectious material

gains entrance through the walls of the lateral sinus (ie from without inward) and yet a thrombus not infrequently develops. That these thrombi are infected their own clinical course demonstrates for if left alone an abscess will either develop at the site or they will give rise to metastatic abscesses.

When a thrombus develops from a small or trifling injury to the intima there is something abnormal in the individual in whom it develops. A person thus afflicted has a focus of infection somewhere in his or her system. This focus of infection may be an old abscess, a pyorrhea, a pelvic cellulitis, degenerating fibroid, etc etc. Simple injury alone will not cause the formation of a thrombus.

DR E C ROSINOW (closing the discussion)

I grant that other lesions occurred as pointed out by Dr Harris but these were slight and transient and no greater than might occur unrecognized in many cases of the same disease in man. Moreover, part of the incidence of lesions in other organs than the ones for which the strain had elective affinity and from which it was isolated as shown in the table is due to the large size of the dose. When the dose was properly given in individual series of experiments it was not so marked. The tendency to infect electively the organ from which isolated is least stable in the strains from appendicitis retaining the tendency only for several subcultures while the ones from cholecystitis retain it for a longer period. All lose it on animal passage as well as on artificial cultivation.

CORRESPONDENCE

THE FALLACY OF AIR EMBOLUS AS A CAUSE OF DEATH IN OBSTETRICAL AND SURGICAL CASES

To the Editor

I practically agree with L. Juhn in Air Embolus in Obstetrics (*Die Luftembolie in der Geburtshilfe*) Journal of Obstetrics and Diseases of Women St. Petersburg 1914 xxix 341 abstracted in the International Abstract of Surgery October 1914

Juhn in a critical review of the cases published in obstetrical literature recognizes only three cases as authentic namely of Olshausen Swinbourne and Litzman and these I do not think as conclusive

Juhn claims that only an autopsy and stained with necessary care with complete macroscopical and microscopical examination of the organs should be regarded as sufficient evidence for a diagnosis of air embolism And then I do not think that the pathological findings will justify the conclusion that death is due to air embolism

In animal experimentation upon etherized dogs I have shown that one can inject with impunity large or small quantities of air directly from a five to twenty five ccm syringe into the veins or arteries with practically no effect upon respiration or upon the heart action in the thorax or blood pressure the latter being usually a mercury manometer

When air is injected into the thorax in a mechanical or adventitious sound is heard over the heart with the stethoscope and the air passes through the ventricle Upon reaching the lungs the air is apparently dispersed

The air injected animal killed shortly after several injections of magnesium sulphate solution afforded no evidence of air embolism

In repeated injections usually 1 ccm to 25 ccm of air thrown directly into the dissected out vertebral artery of etherized dogs from a 25 ccm syringe that the air might be carried to the cerebral vessels the light reactions shown were only momentary and of no moment however

I never states that the presence of air in cerebral vessels may cause clinical pictures of arising gravity from transient nausea vomiting transient blindness brief paresis or brief cramps to actual epileptic seizures or patient may die suddenly without any premonitory symptoms He states that the apparently constant sign of cerebral air embolism easily seen on account of the spontaneous mydriasis the peculiar aspect of the fundus of the eye striking and typical examples of which he shows in a color plate

But relying upon my own experience in this regard I have repeatedly purposely exposed the interior of the uterus to fresh air in the control of post partum hemorrhage and in conjunction with external persistent manual manipulation of the uterus have demonstrated that no woman should be subjected to the danger of infection by packing the uterus However by forcing the entrance of air to the uterine cavity followed by intra-uterine pressure from without every case of post partum hemorrhage per se may be controlled without any fear whatever of an air embolism

Therefore air embolism should not be regarded as the cause of death but rather some other explanation must be sought for

C. H. C. LAWRENCE, M.D.

Mid. Va. W.

Refr. A. Kuhn for T. J. Kuhn, W. B. Kuhn and Co.

BOOK REVIEWS

A CRITIQUE OF NEW BOOKS IN GYNECOLOGY AND OBSTETRICS

By GEORGE GELLHORN M.D. St. Louis Missouri

THE status of the midwife in America is so entirely different from that in Germany that a textbook on obstetrics for midwives is not likely to find a wide demand in this country. This is not the place to discuss the problem of the midwife. But it is an undeniable fact that among the foreign population in our larger cities a large proportion of all confinements variously estimated as from one fourth to one-third is conducted by women whose training is practically nil. Sooner or later some kind of order will have to be brought out of this chaos and the man or men who will then write textbooks for midwives will have to fall back on the book¹ before us which for many years has been the classic of its kind. Rarely does it happen that any medical work appears in fifteen editions. Still more remarkable is the fact that its author the Nestor of German gynecology and obstetrics has been able to attend personally to all fifteen editions in the fifty four years which have elapsed since its first publication.

ONLY by taking a bird's-eye view as it were of the field of obstetrics is it possible to condense the entire subject into a small sized volume. A vast experience as an obstetrician and a teacher has enabled Dr. Davis the well known author to write a manual of obstetrics² with epigrammatic brevity. Nothing that is essential has been left out yet the author has found space to include subjects that are not ordinarily touched upon even in works of greater length such as the medicolegal aspect of obstetric practice and infectious diseases complicating pregnancy for instance typhoid fever pneumonia a spinal meningitis. As a handy reference book the reader will find this work of the greatest value in keeping himself informed as to the latest gains in obstetric science. The selection and quality of the illustrations however are not on a par with the excellence of the reading matter.

THIS book³ has been written by a Hindu physician for the use of students and junior practitioners in India. The author combines an

LEHRBUCH DER GEBURTSHILFE. By Prof. Dr. Bernhard Sigmund Schultze. Fifteenth edition. Leipzig and Berlin: Wilhelm Engelmann 1914.

MANUAL OF OBSTETRICS. By Ed. and P. Davis M.D. Philadelphia and London: W. B. Saunders Co. 1914.

HANDBOOK OF OBSTETRICS FOR STUDENTS AND JUNIOR PRACTITIONERS IN INDIA. By Kedarnath Das M.D. Calcutta: Butterworth & Co. (India) Ltd. 1914.

extensive practical experience of his own with a thorough knowledge of the world's literature on obstetrics. In the arrangement of the subject matter he follows the accepted standard of American and European textbooks. Avoiding all academic discussions on theories he confines himself to the more practical aspects of obstetrics with out however losing sight of the sound scientific basis of anatomy physiology and embryology. Thus the book must be classed as a thoroughly modern work.

Of greater interest to us is the information regarding the influence of race and climate upon pregnancy and parturition. Menarche in Calcutta among English girls born in India or those who have lived for a prolonged period under its climatic influences occurs about one year earlier than among English girls in England. Girls of purely Indian parentage begin to menstruate between two and three years earlier than do English girls born in India and between three and four years earlier than girls in England. The average age of native girls is 11 years 10 months. The early menstruation in Indian girls has been attributed to precocious knowledge of sexual matters due to an absolute want of domestic privacy and also to too early sexual excitement as the result of marriage customs in Bengal where the marriage of girls is rarely postponed beyond the twelfth year.

The effects of the Indian climate as indeed of all tropical climates are manifested by lassitude and depression of spirits during pregnancy due to lowered nervous tension and the strain placed on the thermotaxic mechanism by the unusual thermic environment. Phosphaturia during pregnancy is very frequent.

Malaria is quite a common complication but ordinarily has but little influence upon the course of pregnancy quinine is well borne without causing uterine contractions. Leprosy usually leads to sterility and impotence. If conception occurs abortion generally takes place at about the third or fourth month. Osteomalacia occurs more frequently in India than in England France and America. As to the toxemias of pregnancy it is interesting to learn that the excretion of urea in Bengalese is very much less than in Europeans and the occurrence of eclampsia almost twice as frequent among Indians as among other races. The average size of the pelvis in Hindu women is considerably smaller

Clinical Congress of Surgeons of North America

SIXTH ANNUAL SESSION

BOSTON

OCTOBER 25 TO 30 1915

CLINICAL CONGRESS OF SURGEONS OF NORTH AMERICA

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W F WESSELHOEFT

THE CLINICAL CONGRESS IN BOSTON

THE plans for the Boston session are well under way and a preliminary schedule of operative clinics and demonstrations to be given in the hospitals and medical schools of Boston during the week of October 25th before the members of the sixth Clinical Congress of Surgeons of North America will be found on the following pages

It will be understood that this published schedule is a provisional one and is to be rearranged and amplified during the months preceding the Congress as the work of the Committee on Arrangements progresses. The Committee is determined that during the week of the Congress there shall be a most complete showing of Boston's clinical facilities in all departments. Every branch of surgery is to be included: gynecology, obstetrics, genito-urinary surgery, orthopedics, surgery of the eye, ear, nose and throat. A subcommittee with Dr Eugene A Crockett of the

Massachusetts Charitable Eye and Ear Infirmary as Chairman has been named to have charge of the eye, ear, nose and throat clinics. Another subcommittee of which Dr Robert W Lovett is Chairman will arrange a series of demonstrations and lectures to be given by Boston's best known surgeons and internists on border line subjects and these it is expected will be of very great interest.

LIMITED ATTENDANCE

It has been decided to limit the attendance at the Boston session to a number that can be comfortably cared for at all times following out the precedent established at the last session in London. Advance registration will therefore be required and within a few weeks a detailed announcement of the plans for the Boston session will be sent to all members of the Congress and to those surgeons who have attended previous

session. Cards will then be issued in order of application up to the limit named by the Committee.

HEADQUARTERS

The Executive Committee of the Congress has arranged for the establishment of headquarters at the Copley Plaza which is centrally located in the Back Bay district and from which any of the hospitals and medical schools may be reached in a few minutes. The headquarters of the Congress will be on the ground floor of the hotel where there is ample space for the registration and ticket bureau, bulletin etc. On this floor also is the large ball room in which the evening meetings will be held.

SPECIAL TICKETS

At the present session the hospital committees have recommended the efficacy of special tickets to prevent overcrowding at the hospitals and to provide for the benefit of the visitors attending

the several clinics. Admission to all clinics and demonstrations will be by special tickets which will be distributed to 2000 holders each day at headquarters after the clinical program for the day has been printed on the bulletin board.

EVENING MEETINGS

The Executive Committee of the Congress has arranged for meetings on four evenings of the week. The presidential banquet will occur on Monday evening at which time the address of the President elect Dr. Charles H. Mayo will be read. On Tuesday Wednesday and Thursday evenings there will be two meetings, one for the section on general surgery, the other for the section on special specialties. The Executive Committee will select men to read papers at these evening meetings, bearing in mind the general interest and usefulness of topics for consideration. The practical papers will be read by the surgeons and will be discussed by local surgeons.

PRELIMINARY CLINICAL PROGRAM

MASSACHUSETTS GENERAL HOSPITAL

Monday

- C. A. PORTER—9 Operations Götter Cancer of stomach.
D. F. JONES—9 Operations Cancer of rectum (first stage)
R. C. CABOT, HUGH CABOT and OSCAR RICHARDSON—10 Demonstration Comparison of clinical evidence with postmortem findings.
HUGH CABOT et al.—2 Operations Epididymectomy for tuberculosis Lithotomy for stone Ureterotomy for stone
C. L. SCUDDER—3 Demonstration Fractures
HUGH WILLIAMS—3 Demonstration Cases

Tuesday

- E. G. BRACKETT and R. B. OSGOOD—9 Operations Excision of knee, with bone plates Exploration of knee joint through median incision
D. L. EDGELL—10 Clinic
C. L. SCUDDER and H. F. HEWES— Demonstration Diagnosis and treatment of chronic gastric ulcer
G. W. W. BREWSTER—2 Operations Hysterectomy for fibroids Appendectomy
LINCOLN DAVIS—2 Operations Ureterotomy for stone Hysterectomy
ROGER I. LEE and BETH VINCENT—2 Demonstration Splenectomy for pernicious anemia
C. C. SIMMONS—3 Demonstration Osteomyelitis
G. A. LELAND JR.—3 Demonstration Anthrax

Wednesday

- F. G. BALCH—9 Operation Prostatectomy Abdominal tumor
R. B. GREENOUGH—9 Operations Benign tumor of breast Cancer of breast
Z. B. ADAMS, DANFORTH and H. C. BUCHHEIM— Demonstration Scoliosis
L. T. BROWN—0 Demonstration Postural defects
FARRAR COBB— Operations Hysterectomy for cancer (Wertheim)
HUGH WILLIAMS— Operations Gall bladder
R. C. CABOT, HUGH CABOT and OSCAR RICHARDSON—3 Demonstration Comparison of clinical evidence with postmortem findings.

Thursday

- HUGH CABOT et al.—9 Operations Nephrectomy for tuberculosis Pyelotomy for stone Prostatectomy
R. C. CABOT—0 Clinic
ABNER POST—1 Demonstration Congenital syphilis

- E. G. BRACKETT and R. B. OSGOOD— Operations Open operation on hip G. G. saw osteotomy of knee joint
C. A. PORTER, A. K. STONE, H. F. HEWES and J. B. HARTWELL—3 Demonstration Tuberculous cervical adenitis
W. J. MYSTER—3 Demonstration Fracture of the skull

Friday

- C. L. SCUDDER—9 Operations Duodenal ulcer Cancer of stomach Fracture of femur
R. B. GREENOUGH—9 Operations Cancer of jaw tongue or lip
J. C. WARREN—0 Demonstrations Reminiscences of the discovery of ether
C. A. PORTER—10 Demonstration Cases
R. H. MILLER—0 Demonstration Tetanus
C. A. PORTER— Operations Tuberculous cervical adenitis Operation on peripheral nerve
D. I. JONES— Operations Cancer of rectum (second stage)

Saturday Specials

- A. COOLIDGE, J. P. CLARK, H. P. MOSHER, D. C. GREENE, W. F. KNOWLES, H. A. BARNES, C. ROBBINS, and F. E. GARLAND—Eye, ear, nose and throat clinics, daily
G. H. WRIGHT— Demonstrations in oral surgery
J. L. GOODALE— Demonstration The diagnosis and desensitizing of hay fever

BOSTON CITY HOSPITAL

Monday

- J. B. BLAKE, W. E. FAULKNER and L. R. G. CHANDON—9 Operations Surgical
F. S. NEWELL, E. B. YOUNG and N. R. MASON— Operations Gynecological
G. P. SANBORN—3 Demonstration End results: the tuberculin treatment of lymphnodular tuberculosis
F. W. WHITE, F. B. LUND and R. D. LEONARD—4 Demonstration Diagnosis and treatment of ulcer and cancer of the stomach (medical and surgical X-ray)

Tuesday

- F. B. LUND, F. J. COTTON and D. D. SCAYVELL—9 Operations Surgical
PAUL THORNDIKE and assistants— Operations Genito urinary
PAUL THORNDIKE—3 Demonstration Prostatectomy Rectal calculus
HORACE BRINLEY—4 Demonstration Treatment of tumors of the bladder with the high frequency current

T W HARMER—Wednesday 2 30 Demonstration
The treatment of birthmarks

PROFS. ERNST FOLIN HUNT CANNON, WOLBACH DES
LOVETT STONE and MORSE—Tuesday 4 30 Clinic
Cervical adenitis

DRS CROSBY GREENE and T E GARLAND three after
noons Eye Ear Nose and Throat clinic.
Visit to general surgical wards daily 10 to 11

PETER BENT BRIGHAM HOSPITAL

HARVEY CUSHING—Daily Clinics or demonstrations
Surgery of the brain pituitary body spinal cord
peripheral nerves

DAVID CHESLER and JOHN HOMANS—Daily Operations
Surgical

HENRY A CHRISTIAN CHANNING FROTHINGHAM and
others of the medical staff will co-operate in giving
clinics or demonstrations on selected topics, such as
the electrocardiogram etc

MASSACHUSETTS HOMIOPATHIC HOSPITAL

Monday

A G HOWARD and H MOORE—9 Operations Or
thopedic

J H PAYNE and D W WELLS—9 Operation Eye
DRS RICE HOUGHTON and C SMITH—2 Operations
Nose and throat

W F WESS LINGOTT and T E CHANDLER—Opera
tion General surgery

Tuesday

J F BIGGS and C T HOWARD—9 Operations
General surgery

G A SUTTA and A W HERR—9 Operations Eye
HORACE PACKARD and C T HOWARD—Operations
General surgery

DRS RICE HOUGHTON and SMITH—Operations
Nose and throat

Wednesday

DRS RICE HOUGHTON JOHNSON SMITH and BUSH—9
Operations Nose and throat

GEORGE H FARR and H MOORE—9 Operations
Orthopedic

W F WESS LINGOTT and R C WIGGIN—Operations
General surgery

F W COLBY—2 Operations Ear

Thursday

J I BRIGGS and C CRANE—9 Operations General
Surgery

DRS RICE HOUGHTON and C SMITH—9 Operations
Nose and throat

G R SOUTHWICK—2 Operations Gynecological

Demonstrations

W H WATTERS—Surgical pathology

G A SUTTA—Ophthalmotropes

Routine Examination of Ante partem Cases—Wednes
day 10

Social Service Clinic for Post partem Cases—Thurs
day 2

Daily clinics in twilight sleep

Daily exhibition of new maternity building

TUFTS MEDICAL SCHOOL

A W GEORGE—Daily 2 to 5 Rontgenological demon
stration

CARNEY HOSPITAL

J T BOTTOMLEY and D F MANONEY—Monday
Wednesday and Friday 9 Operations Surgical

W R MACAUSLAND and A R MACAUSLAND—Monday
Wednesday and Friday 9 Operations Orthopedic

F W JOHNSON and S RLEMORE—Tuesday and Thurs
day 9 Operation Gynecological

FREE HOSPITAL FOR WOMEN

DRS GRAVES FEMBERTON WADSWORTH HUTCHINS and
BAKER—Tuesday Wednesday and Thursday 9
Operations Gynecological

DR FEMBERTON—Wednesday 2 30 Cystoscopic dem
onstration

DR HUTCHINS—Thursday 2 30 Demonstrations
Laboratory specimens

ST ELIZABETH'S HOSPITAL

DRS LA and SUTTA—Monday and Thursday 9
Operations

DR CROSBY—Monday Tuesday and Friday 9 Wed
nesday 9 Intravenous salt man i jec
tions

DR B OFFICER—Tuesday 9 Orthopedic operations
and clinic

D CRUTCH—Wednesday and Friday 9 Operations
Gen- eral

DRS BRAINARD and HOLME—Tuesday 9 Nose and
throat clinic

DR DOWN—Monday and Friday 2 Demonstra
tion Laboratory technique

DR BUTLER—Tuesday and Thursday 10 Demon
strations X

DRS McDONALD and MCADAMS—Wednesday 10
Eye clinic

The history and prognosis and indication for operation in
each case will be discussed previous to operation by Dr
Crown of the medical service and Dr Butler of the ro
t gynecological department.

ROBERT BRICHAM HOSPITAL

CHARLES F. FAIRY, EDWARD RICHARDSON, LLOYD T. HOWE and RICHARD MILLER—Tuesday and Thursday—1 Operation. Monday, Wednesday and Friday 3 Clinics 4 Cases of chronic larynx, arthritis, intestinal tuberculosis, peritonsillar abscess, hemolytic diseases.

LONG ISLAND HOSPITAL

F. H. LANEY—Monday 2 Operations.
J. H. CLARKSON—Tuesday and Wednesday 2 Operations.
ROBERT SUTTER—Thursday and Friday 2 Operations.

NEW ENGLAND HOSPITAL FOR WOMEN AND CHILDREN

MARY A. SMITH and ALBY M. O'KEEFE—Monday and Thursday 1 Operation Gynecological.
ELIZABETH T. CRAY and LUTHER D. ADAMS—Monday 2 Tuesday 10 Operations Gynecological.
FRANK B. CLIBERTSON and CLARA S. COOPER—Tuesday and Friday 2 Operations Gynecological.
FLORENCE DICKENS and LUTHER D. ADAMS—Wednesday 1 Thursday 2 Operations Gynecological.
MAUDE CARVILLE—Thursday 2 Eye clinic.
MARION VOYLES—Wednesday Ear, nose and throat clinic.
ISABELLE D. KERR—Friday a. Ear, nose and throat clinic.

Scopolamine morphia anesthesia both with and without ether will be used during these clinics. Statistics covering six years continuous use of this form of surgical anesthesia on over 1400 cases are available. Dr. Abby M. O'Keefe professional anesthetist has entire charge of this department.

HOUSE OF THE GOOD SAMARITAN

Drs. SUTTER, LEGG and SEVER—Monday, Wednesday and Friday a. Clinics 1 Infantile paralysis, multiple splenectomy flattened condition of the head of the femur, obstetrical paralysis.

CODMAN HOSPITAL

L. A. CROWT—Tuesday, 1 Operations, Surgery, Demonstration of lesions about shoulder joint. Thursday a. Operations 5 Special Demonstration of lesions of the elbow.

MASSACHUSETTS CHARITABLE FREE AND INFIRMARY

Drs. CROCKETT, MOCHER and JAMES—Monday, Friday Otolological clinic.
D. JACK WALKER, FOWLER and BLOOMETT—Tuesday Otolological clinic.
Drs. HARMON, WHITE and FAY—Wednesday Otolological clinic.
Drs. JACK KNOWLES, TERRY and BOGGS—Thursday Otolological clinic.

Eye clinic daily from 9 to 12. Various operations, lid, tear sac and muscles of the eye. Different types of operation for cataract and glaucoma. Magnet operation for the removal of foreign bodies from the eye. Different methods of using local anesthesia. Tuberculosis of eye. Interstitial keratitis. Pterygium. Ophthalmic reconstruction and gonorrheal ophthalmia in adults. Localization of foreign bodies in the eye by the X-ray. Demonstration of ophthalmometer for measuring astigmatism of the lens. Demonstration of lantern slides by pathological department.

HARVARD MEDICAL SCHOOL

FRANK COUNCILMAN and MALLORY—Demonstration Pathology.
PROF. C. V. and W. T. PORTER—Demonstration Physiology.
PROF. FOLIN—Demonstration Chemistry.
PROF. STRONG—Demonstration Tropical Medicine.
PROF. REID HUNT—Demonstration Pharmacology.
Drs. ORDWAY and TYZIKER—Demonstration Cancer research.
JOHN WARRER—Demonstration Anatomy.
W. F. WHITE—Demonstration Warren anatomical museum.
F. T. LEWIS—Demonstration Embryology.
J. E. GILBERTSON—Demonstration Visceroperitoneum.

SURGERY, GYNECOLOGY AND OBSTETRICS

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EMPHYEMA OF THE THORAX¹

I A CRITICAL STUDY OF TWO HUNDRED AND NINETY NINE CASES OF ACUTE EMPHYEMA OF THE THORAX TREATED AT MOUNT SINAI HOSPITAL, NEW YORK IN THE LAST TEN YEARS

By ABRAHAM O. WILENSKY M.D. NEW YORK

Adjunct Attending Surgeon Mount Sinai Hospital

HISTORICAL

THE fact that pus could accumulate in a person's chest was a fact well known to the ancients, and by the time of Hippocrates and his school the lesson had been learned that nature could be helped in curing this disease if an opening were made in the chest in order to allow the pus to escape. Intercostal incision usually made with the cautery and trephining of a rib were the operations done even in those early times. The mortality was very high the causes of death being sepsis or the very prolonged suppuration. What was done with the chronic sinuses for it must be believed that such occurred not infrequently is not described.

These methods persisted until the times of Galen but the results were very poor the mortality with and without operation being about the same. Operative treatment was therefore gradually abandoned and in the time of Celsus was practically never done. The mortality without operation was above 90 per cent. With the revival of all learning in the sixteenth century with the beginning of post mortem study and the renewed study of the works of Hippocrates operative treatment was again resumed. Even then the mortality was very high.

Up to the last century the diagnosis of pus in the chest was always somewhat a matter of guesswork but from this time onward the science and practice of physical diagnosis began to be developed and with its extended use the question of whether or not a chest contained fluid could be determined accurately and operative measures could therefore be instituted earlier.

Results of operative measures were still however not ideal and attention began to be paid to other methods of treating this disease. Dayfair (1) in 1873 was the first to advise aspiration of the chest, and the method was developed and made use of by Dieulafoy (2) and Potain (3). Figueira (4) Finney (5) and Mackey (6) all three writing in 1875 advised puncturing the chest with a cannula and washing out all the pus in the pleural cavity with solutions containing either carbolic acid or tincture of iodine. As was to be expected this method yielded uniformly bad results and three years later Roser (7) going a step forward advised resecting a rib and draining the pleural cavity if there was any difficulty in clearing the chest of pus through the trocar opening. He still believed however that in a certain percentage of the cases, in which the pus was thin, a cure could be

¹ A second paper dealing with the subject of chronic emphysema sinu will shortly be published in this paper.

attained by this latter method. He studied the expansion of the lung in those cases in which he opened the chest and described his findings in a paper.

In the same year König (8) recognizing the value of rib resection and the insufficiency of the trocar opening in the great majority of cases advised rib resection as a routine measure for all empyemata with repeated irrigation of the pleural cavity through the opening in the chest wall.

During the nineties the principle of routine rib resection had become well established in America and among its exponents we find Cabot (9) Holt (10) Dowd (11) Koplik (12) and Bovald (13). The mortality had been forced down from 80 or 90 per cent to about 30 per cent.

Abroad special attention was being given to improving the methods for draining the pleural cavity. The methods of Playfair (1) Dieulafoy (2) and Potain (3) were revived and elaborated. Bulau (14) in 1891 described his method of siphon drainage. It combined the exclusion of air from the pleural cavity with continuous drainage under slight negative pressure. In 1898 Lethes (15) added a water pump to the drainage mechanism with the object of draining the chest under continuous high negative pressure. Nordmann (16) in 1907 devised a special form of apparatus for this continuous suction drainage. Tiegel (17) in 1911 devised a metal drainage tube with a valvular opening which permitted only escape of air from the chest. Lawrow (18) reported the results obtained at the St. Petersburg clinic in the years prior to 1913 making use of a modified Nordmann apparatus. In the same year Hahn (19) noted the results obtained with the Bulau siphon drainage under continuous negative pressure with the Potain apparatus.

In 1906 Lloyd (20) of New York went a step further in treating this disease. He noted the fact that a certain number of the cases did not have perfect healing of their wounds after the primary operation and that secondary operations of one kind or another were very frequently necessary. He studied the various causes for the non healing of the sinuses, and attempted to obviate these at the

primary operation. He treated two hundred and twenty five cases by the method which he elaborated and reported very creditable results. His mortality was 0 per cent. A modification of this method has been recently devised and elaborated by Silenthal.

GENERAL CLASSIFICATION

The present studies in acute empyema of the thorax are based upon the records of all the cases admitted to the surgical service of Mount Sinai Hospital during the period of ten years from December 1, 1903 to December 1, 1913. These include the cases occurring in children as well as in adults. The records are those on file in the hospital.

During this period there were admitted and treated a total of two hundred and ninety nine cases of acute empyema. The total mortality was 98 per cent, eighty two of the patients having died as a result of the primary disease or of some complication or intercurrent disease. The classification according to groups and the individual mortalities is shown in the following table. The important fact to note is the comparative infrequency of tuberculous empyema, these totaled about 2 per cent of the whole.

	No. of Cases	Deaths	Per Cent
Acute empyema	4	0	20
Tuberculous empyema	6		
Pneumothorax	7	4	1
Chronic empyema		3	
Total	200	8	8

During this period also there were treated in the hospital a total of 15,315 patients including both medical and surgical cases. The incidence of empyema in our hospital amounted to $\frac{1}{2}$ per cent. Deaths from empyema accounted for 135 per cent of all the deaths in the hospital.

ETIOLOGY

1. The ages of the patients are given in the following table. The mortality is also given for each age period.

	Cases	Deaths
Under 1 year	44	21
1 to 2 years	67	21
2 to 3 years	20	
3 to 4 years	8	
4 to 5 years	13	2
5 to 10 years	20	1
10 to 20 years	26	4
20 to 30 years	34	7
30 to 40 years	16	5
40 to 50 years	11	4
50 to 60 years	9	5
60 to 70 years	3	
Youngest 5 weeks		
Oldest 64 years		

The disease is most common in the first two years of life more than one-third of the cases occurring in that period. As is to be expected the mortality is also highest during that period. In the first year 48 per cent of the cases are lost in the second 31 per cent in the third year 41 per cent. For the rest the average mortality is about 18 per cent. The most favorable period seems to be that between three and ten years of age. The youngest patient was five weeks the oldest sixty four years old and both recovered.

Our records for the first two years of life compare very favorably with that published by Holt (22) and dependent on the statistics of the Babies Hospital of New York City. In that institution 73 per cent of the children under one year of age and 58 per cent of those in their second year were lost. Our records also compare very favorably with those published by Laxrow (18) his mortality the patients all being over thirteen years of age was 45 per cent.

Sex. Approximately two thirds of our patients were males and a little more than one third were females as shown below. No adequate explanation for this difference between the sexes is available at the present writing.

Males	59 per cent
Females	41 per cent

Causation. In 256 of the patients the accumulation of pus in the pleural cavity occurred as a complication of some previous affection of the lungs or pleura. This made 83 per cent of the total. One hundred and ninety eight or 66 per cent of all the cases followed either a lobar or bronchopneumonia. In eight of the patients the pneumonia itself had occurred as a complication of an already

preexisting disease. The etiological classification is shown in the following table.

	Cases	Deaths
Pneumonia (lobar or broncho-)	198	43
Measles and pneumonia	4	
Typhoid and pneumonia	1	
Burns and pneumonia		
Enterocolitis and pneumonia		1
Primary in the pleura	33	7
Infected pleural effusion		
Infected hydropneumothorax	1	1
Pyopneumothorax	7	4
Pulmonary and pleural tuberculous	6	1
Lung abscess	6	5
La grippe	3	
Diphtheria	2	1
Enterocolitis in infants	3	2
Tonsillitis		
Metastatic to bacteremia	4	1
Metastatic to post partum sepsis	1	1
Metastatic to diseased adnexa		2
Metastatic infection of vaccination ulcer	1	1
Metastatic to acute appendicitis	3	1
Metastatic to middle ear disease		1
After retropharyngeal abscess		
After rib abscess	1	
After hemorrhoidectomy metastatic infection	1	1
After curettage metastatic infection		
After stab-wound of chest		
After blow in chest		
Fish bone perforating from esophagus into pleural cavity	1	1
Carcinoma of esophagus rupturing into pleural cavity		1
Actinomycosis		
Not determinable	9	4

In thirty three of the patients the empyema occurred as a primary disease. The history usually given was that the patient had sickened with malaise fever and a slight cough with little or no expectoration blood tinged only in those who were tubercular. Usually after a period varying from a few days to several weeks the patients were brought to the hospital where the diagnosis was not always immediately made. Speedily however the signs pointed to fluid in the chest and exploratory aspiration demonstrated its purulent nature.

Empyema frequently appears as a secondary focus to some inflammatory lesion in a distant region of the body. We have seen it occur in the bacteremias usually of the staphylococcus or streptococcus groups also after infections of the pharynx and tonsils after appendicitis either with or without abscess formation or after purulent inflammations of the uterus and adnexa occurring

in the puerperium or independent of it after a hemorrhoid operation and after an infected vaccination ulcer. These comprised between 2 and 3 per cent of all the cases. One child developed an empyema after an acute otitis media.

Eight of the patients developed their empyema after one of the infectious diseases. Undoubtedly we would have had a great many more if it were not for the fact that infectious diseases are not admitted to our hospital. Nor do our mortality statistics show the true condition for the reason that when a case of infectious disease develops in our wards the patient is transferred usually to a special hospital. It would seem however from our studies that pneumonia is almost invariably an intermediate factor in the production of an empyema in this class of cases.

Five times empyema has followed enterocolitis in infants. This etiological link has also been noted by Zybelle (23). The infection may come directly from the bowel by way of the blood or lymphatic streams or the empyema may be metapneumonic inasmuch as pneumonias are very common complications of the diarrheal diseases. The majority of these patients die from the exhausting diarrhea and not from the chest condition. It will be noted later that when infants are ill with empyema during the summer months enterocolitis frequently is a complication.

In our series empyema has also followed a blow or stab-wound of the chest or has resulted from a new growth or abscess in an adjacent viscus rupturing into the pleural cavity. All of these however as causes for intrapleural suppuration are exceptional.

The group including infected pleural effusions, hydro-pneumo and pyopneumo thorax are probably primarily tubercular in their origin. With those classified definitely as tuberculous they number sixteen or 5 per cent of the total number of cases treated in the hospital. Seven of these patients died almost 50 per cent. Two things are to be noted: the comparative infrequency of tuberculous empyema and the high mortality. A great many of those that do not die develop chronic sinuses which not infrequently show tuberculous granulation tissue and are the

most difficult to heal. One of these patients was operated upon numerous times each time the operation grew more formidable and dangerous and healing was finally obtained only when the scapula was implanted into the huge defect in the chest wall.¹

More commonly than is supposed empyema follows abdominal operations of one kind or another which necessarily do not have to be performed in infected territory. A case in point is the following:

A young man was admitted with the history of repeated attacks of appendiceal colic for which a practically normal appendix was removed. A rather stormy course was marked by the development of pus in the chest without any intervening pneumonia from which the patient subsequently died. No peritonitis or subphrenic abscess was found at autopsy.

Empyema has been known to follow operations upon the gall bladder and upon the female pelvic organs; they are usually of a severe type and are particularly prone to go on to a fatal termination. It is probable that in these cases infection is carried from within out into the peritoneal cavity and passing thus by becomes localized in the pleura.

Side affected. There seems very little difference in the frequency with which the right and left sides of the chest were involved. About 2 per cent of the patients had both sides involved and when that occurred many of the patients died.

PATHOLOGY AND BACTERIOLOGY

Primary empyema has already been spoken of in the earlier part of this paper. Caution is needed before such a diagnosis is made inasmuch as other lesions must first be excluded and frequently this is impossible for the reason that in many of the cases the primary pneumonia or other focus has entirely cleared up by the time the patient comes under observation. The mode of infection is by direct conveyance in the air stream to the ultimate air alveoli where they lie in relation to the visceral pleura. Probably also in certain of the cases the infection is transmitted by the lymphatic structure of the lung parenchyma and causes the reaction in the pleura alone.

¹This patient as operated upon by Dr. Asquith G. Genter.

There seems to be a difference of opinion among the different writers as to how frequently primary empyema occurs and one obtains the impression that while the percentage relation to the total is very small still it occurs much more commonly than is supposed. In these cases the exudate is purulent from the very beginning.

That empyema can occur as a primary disease was known as long ago as in the eighties Grawitz (25) and Arnold (26) noted that bacteria in the inspired air could be absorbed by the lymphatic apparatus of the lung and cause an inflammatory reaction in the pleura alone. Heller (27) described collections of lymphadenoid tissue in the visceral pleura and noted that they formed counterparts to the bronchial lymph nodes. Similar lesions affected both sets of gland. Netter (28) also could determine in four of his patients that the empyema was independent of any other lesion.

Finkelstein (29) has described empyemata occurring in children due to an infection in the floor of the mouth extending along the lymphatics of the neck into the mediastinum and pleural cavity. No case resembling these was encountered in our series.

Serous effusions due to cardiovascular or other organic lesions may become infected by an exploring needle or by the blood or lymphatic streams. It is almost the usual thing to put the cause of this accident upon the lack of asepsis on the part of the person doing the chest exploration but in a few cases especially when there are no immediate subjective or objective signs of this accident other causes should be looked for. Lesions in other parts of the body, the expressions of bacterial invasion perhaps unknown to the clinician may furnish the etiology.

Patients who have developed hemothorax as the result of stab or gunshot wounds harbor an excellent culture material for the growth of bacteria and frequently the hemothorax becomes an empyema. The important point surgically is that when a hemothorax is opened it must always be drained very fully.

A symptom-complex has been described by Heubner (30) in which more than one and

sometimes all of the serous membranes of the body become the seats of purulent exudates. Usually the pleura is one of these. Clinically they are met with most often in children and with the general picture of a sepsis, exudation is made out in the various serous cavities. The disease usually goes on to a fatal termination. No example of this condition exists in our series.

Empyema of the thorax is very frequently metastatic to purulent foci in different and distant regions of the body. How many of these we have had and after what infections empyema has followed has been detailed before. Usually the path of conveyance is by the blood stream. Metastatic empyema may also represent a fixation abscess in the course of bacteremia. By this is meant that during the course of a blood infection bacteria may for one reason or another be attracted and localized in one focus and when this occurs an abscess results. When such an abscess forms the bacteria are likely to disappear from the blood but just as often they do not and then the ultimate prognosis will depend on the primary portal of entry of the infecting organism or on its virulence. This much can be said however that when such an abscess forms the prognosis assumes a much better character.

An abscess in the immediate neighborhood of the pleura may rupture into it and a certain number in our series are accounted for on this basis. The original abscess may have been located in the liver or subdiaphragmatic space or in the lesser peritoneal cavity in the chest wall or under the mammary gland in the bronchial lymph nodes or in the mediastinum and lastly in the lung where it may also represent an infected bronchiectatic cavity. The rupture may not be due to an abscess but may result from the ulceration of a new growth in an adjacent viscus as in the esophagus or stomach. Echinococcus cysts of the liver or other neighboring organs may break through into the pleural cavity and becoming infected give rise to an empyema.

A rather unusual case is the following.

A woman was admitted to the hospital with a puerperal breast abscess which having been properly incised and drained was later dressed in our

primary. She returned a short time thereafter complaining of chills, fever and pain in the upper portion of the chest on the same side as the breast abscess. Exploration revealed an abscess in the upper mediastinum. A lateral empyema was also present and after she died turbid fluid was found in the pericardial sac. At no time was there a bacteremia.

It is not essential for the adjacent abscess to rupture into the chest. The infection may travel through the lymphatics especially of the diaphragm and infect the pleura by contiguity so that it is quite common for one to find abscesses above and below the diaphragm which are separated by an intact wall.

Most of our cases of course were metapneumonic. The original consolidation may have been of the lobar or of the lobular type and dry pleurisy may or may not have been present. Very frequently in children the pleura and lung simultaneously become the seat of the infection—so-called pleuropneumonia—and in addition to the intrapulmonary exudate the pleura becomes covered with large shaggy masses of fibrin. In these cases it is not surprising that so frequently a purulent exudate forms in the pleural cavity rather than it is surprising that it does not always occur. This prevalence also accounts for the great frequency of empyema in young children.

The distinction has recently been drawn by (Shrader) (31) between empyemata which appear after the primary pneumonia has subsided—metapneumonic empyemata—and those discovered before the crisis of the pneumonia—parapneumonic empyemata. The distinguishing characteristics of the latter are (1) purulent exudate in the fibrinous stage of the pneumonia (2) bacteria free pus (3) small amount of exudate (4) smooth contour—no disturbance of pulse or temperature. We believe this distinction to be purely a semantic and in our series have been unable to distinguish clinically between the two.

Empyemata which are due to the rupture of intrapulmonary foci of suppuration are the

ones which are most dangerous frequently being the cause of the formation of bronchopulmonary fistulae. The suppuration may be due to the ordinary pus producing organisms or may be tubercular. It may be bronchiectatic may originate in a gangrenous process in a consolidated lung or may follow an influenza pneumonia. The bronchopulmonary fistula may be a narrow sinus connecting the bronchus with the skin or its path may be interrupted by an abscess either in the lung parenchyma or in the pleural cavity. The occurrence of such a fistula precludes the idea of healing of the empyema sinus until the opening in the bronchus has closed. In a few cases this has been known to occur spontaneously most often it is necessary to interfere surgically and this is usually a most difficult task for the surgeon. Secondary bronchiectasis is very apt to form around a bronchopulmonary fistula and adds to the misery and discomfort of the patient and the difficulties of the surgeon. In these cases only a radical operation will suffice to resect a part of the affected portion of the lung.

The question has been raised by Rowenbach (32) as to whether empyema in the metapneumonic types is not caused by the rupture of a small superficial lung abscess resulting from a focus of liquefaction in a consolidated lung. Undoubtedly this occurs. In just how many of our cases this did occur it is impossible to determine both for technical reasons and for the reason that most of the cases recover and those that die do not all come to autopsy. Clinically it would be impossible to determine this inasmuch as these small areas of liquefaction would pass unnoticed in the course of the disease.

Tuberculosis of the pleura is nearly always secondary to tuberculosis of the lungs or bronchial lymph nodes. It is met with very commonly but in our experience it gives rise to suppuration only rarely. There are several ways in which suppuration can occur. The usual way is for a caseating focus in the lung to rupture into the pleura or for a cavity to ulcerate through. This eventually gives rise to a pyopneumothorax the symptoms of which may be very marked the course of the affection then running rapidly on to a fatal

2. even so and by some as here to mean acute necrotic infection of lung tissue in pneumonia. Pyopneumothorax is the suppurative condition of the lung cavity caused by rupture of abscess. This infection is seen in the human being.

termination or the symptoms may be so mild that at operation the presence of both air and pus in the chest brings the first knowledge of the true condition. Tubercles on the pleura either visceral or parietal may caseate and rupture and so give rise to empyema. A tubercular abscess originating in a focus in a rib may also in rare instances rupture into the pleura an empyema results. In these varieties the adhesions which may form between opposing layers of the pleura are exceedingly tough and strong and at operation it is impossible to tear them loose.

In such a condition the tuberculous tissue will spread out over the wall of the abscess cavity and when the chest is opened will account for the sinus staying open an interminable time. The process can be recognized histologically in specimens excised from the fistulous tracts.

There is no example in our series of a gangrenous empyema. Such a condition presupposes a most virulent infection usually with streptococci closely related to the erysipelatosus group and the termination of the illness is invariably fatal.

Whatever the cause of the empyema may be the pleural cavity is entirely involved in the majority of the cases. No adhesions may be present and the pus may circulate over all the lung surfaces between visceral and parietal pleura. There is no trouble with the healing of such a case inasmuch as the lung expands fully and obliterates the abscess cavity. Or the lung is shrunk up over its own hilus and a huge cavity is present which is full of pus. These are the cases which show the tendency to the formation of chronic sinuses because of the uncollapsibility of these cavities.

On the other hand the area of pleura involved may correspond accurately with the area of involvement of the primary focus and then the exudate in the pleural space is walled off by adhesions. Such a localization may occur in relation with the diaphragmatic or mediastinal pleura or may be enclosed in one of the fissures between the lobes of the lung. Clear fluid may accumulate in the free portion of the pleural cavity.

These interlobar empyemata are met with

quite frequently both in children and adults. There are nine of such empyemata in our series and they occurred with equal frequency in the right and left sides of the chest. Unless fairly early drained they have the tendency to rupture into the lung parenchyma and to discharge through a bronchus. Bronchopulmonary fistula is a common complication. These abscesses usually lie under cover of the fourth, fifth or sixth ribs in the axillary side of the chest.

There are records of three cases of empyema necessitatis, two of these left sided and the third right sided. All of them pointed in the neighborhood of the mammary line. None of these showed any pulsation. Paillard and Quiquadon (33) have recently discussed this phase of the subject. The belief has always been that the mechanical conditions necessary for pulsation were large purulent effusions containing air and on the left side of the chest. However, Paillard and Quiquadon point out that these conditions are not essential and that pulsation can be present with right-sided effusions with serous exudates and with encapsulated empyemata. Further studies are necessary before this point can be cleared up.

Character of the effusion. The character of the exudate has varied with the different causes. In some and this usually in children with the pleuropneumonic type of inflammation it has been purulent from the very beginning. This also applied to those produced by the rupture of abscesses or of pathological lesions in adjacent viscera. In others the exudate was serous at first and very soon became purulent. The presence of clear fluid might also indicate that an abscess was situated close by either in the lung or under the diaphragm and might or might not presage its immediate rupture. Localized or interlobar empyemata have sometimes been surrounded by clear fluid in the free portion of the pleural cavity or the pleural cavity was divided by adhesions into several loculi, some of which contained pus while the others contained clear fluid. Analogous conditions are sometimes met with in the abdominal cavity, where tuboovarian abscesses are frequently surrounded by inflammatory cysts contain-

ing clear fluid or by serous exudate in the free peritoneal cavity

These serous effusions which serve to cover up and hide an underlying purulent collection have been studied and described by Koninger (34). He calls them *mantellergüsse*—cloak effusions—and considers them sympathetic effusions playing a rôle similar to that of a collateral edema around an abscess in the soft parts. It is most important to bear these conditions in mind when exploring the chest for pus. Koninger also pointed out that in very large effusions, clear fluid may separate out and float on top of the heavier pus and if in these the aspiration is made too high only clear fluid may be withdrawn. Such a finding is not recorded in our series.

The character of the cellular content of the exudate varies. Normally there are very few cells in the pleural fluid and these are mostly endothelial cells and lymphocytes. Even in the so called clear exudates and certainly in those that are turbid the number of cells is enormously increased and the differential count of these cells made in the usual way may show a predominance of either the lymphocyte or the polymorphonuclear cell the former in tubercular the latter in pyogenic infections. In patients suffering with any of the blood diseases the cellular character of the exudate will reflect the kind of cell predominating in the blood picture and when abnormal cells such as myelocytes are present in the blood these too will appear in the exudate. This holds true for purulent exudates in other parts of the body.

Bacteriology. There are records¹ in the Mount Sinai Hospital Pathological Laboratory of the bacteriological examination of pleural exudates of all kinds in 574 cases. The results are classified in the following table.

	Cases
<i>Pneumococcus</i>	89
<i>Streptococcus</i>	3
<i>Streptococcus mucosus capsulatus</i>	9
<i>Staphylococcus aureus</i>	5
<i>Staphylococcus albus</i>	9
<i>Staphylococcus citreus</i>	5
<i>Bacterium coli</i>	4
<i>Bacillus typhosus</i>	
<i>Bacillus proteus vulgaris</i>	

Thank are due to D. F. S. Mandelbaum for the privilege of making use of the laboratory records.

<i>Bacillus mucosus capsulatus</i>	2
<i>Bacillus influenzae</i>	2
<i>B. cilius tuberculosus</i>	7
<i>Bacillus fusiformis</i> (of Vincent)	
<i>Bacillus fluorescens liquefaciens</i>	1
<i>Pneumococcus</i> and gram-negative bacilli	4
<i>Pneumococcus</i> and gram-positive bacilli	1
<i>Pneumococcus</i> and <i>Staphylococcus aureus</i>	1
<i>Streptococcus</i> and <i>Staphylococcus</i>	5
<i>Streptococcus</i> and gram-negative bacilli	
<i>Streptococcus</i> and gram-positive bacilli	4
<i>Staphylococcus aureus</i> and <i>albus</i>	2
<i>Bacterium coli</i> and <i>Streptococcus</i>	2
<i>Bacterium coli</i> and <i>Staphylococcus</i>	
<i>Bacillus influenzae</i> and <i>Streptococcus</i>	
<i>Bacillus influenzae</i> and <i>Staphylococcus</i>	1
Gram-positive bacilli	1
Gram-negative bacilli	7
Gram-positive and negative bacilli	3

¹ Laidlaw and

In another series of cases the relationship of the bacteriological findings to the mortality was studied in true empyema of the thorax. The results are as follows:

	Cases	Deaths
<i>Pneumococcus</i>	66	4
<i>Staphylococcus aureus</i>		4
<i>Staphylococcus citreus</i>		
<i>Streptococcus</i>	10	1
<i>Streptococcus mucosus capsulatus</i>		0
<i>Streptococcus</i> and <i>Staphylococcus</i>	3	1
<i>Pneumococcus</i> and <i>Staphylococcus</i>		
<i>Pneumococcus</i> and <i>Streptococcus</i>		
<i>Bacillus tuberculosus</i>	6	
<i>Bacillus influenzae</i>		
Anaerobic bacteria	7	2
Anaerobes and <i>Streptococcus</i>	1	
<i>Actinomyces</i>		1
<i>B. cilius fluorescens non liquefaciens</i>		1
Cultured	7	1

Pneumococcus infections show a high mortality for the reason that so many of these empyemata originate in a pneumonia and many of these patients die from their lung condition and not from the empyema. As for the rest of the organisms found the tables are self-explanatory.

Clinically the microscopical examination of the exudate should be made in connection with bacteriological studies. Clear turbid or frankly purulent exudates may or may not have bacteria, as demonstrated in smears and when bacteria are present the failure of growth would indicate that the bacteria were dead and were doing no harm in the body. Clear fluids with bacteria would indicate that one might expect a purulent exudate to develop. On the other hand turbid fluid with a polynucleosis and no bacteria as demon-

strated in smears might indicate that the exudate in the pleura was sympathetic to some inflammatory lesion near by the proper treatment of which would result in the disappearance of the pleural exudate. Such a condition might also presage the impending rupture of an adjacent abscess. Turbid or purulent effusions containing living bacteria in a patient who showed to a marked extent the effects of the bacterial toxæmia would indicate that the bacteria were especially virulent or that the natural antibodies had not been developed in sufficient numbers to counteract the effects of the invading organisms. When a purulent exudate shows no bacteria in cultures or smears it is very probable that the tubercle bacillus is the cause of the infection and attempts should be made to recover the organism by animal inoculations. The bacilli are so few in number that with the ordinary methods it is quite impossible to demonstrate them.

Aseptic purulent exudates are uncommon. They can occur with embolic pneumonias. As a rule the leucocytes forming the exudate are well preserved and contain well formed nuclei. In a bacterial exudate the leucocytes are degenerated and sometimes fragmented and the nuclei show more or less autolysis. According to Dieulafoy (21) it is quite a simple matter to distinguish between bacterial and aseptic exudates by these means.

A certain number of our cases as shown in the tables were caused by anaerobic bacteria. Clinically these differed in no way from those empyemata caused by the ordinary pus-producing organisms.

Blood cultures. In the pathological laboratory of Mount Sinai Hospital investigations have been carried on for a number of years under the direction of Doctor Libman concerning the bacteriology of the blood in infections both medical and surgical. A part of these studies covers the subject of thoracic empyema and at a later time Doctor Libman and I propose to publish the results. At the present writing it appears to us that bacteria are not found in the circulating blood as a result of the purulent exudate in the chest except under the following conditions: (1) In

the presence of complications such as arthritis or osteomyelitis (2) as an ante mortem invasion in the fatal cases.

In a certain number of the cases the chest condition forms only one part of a larger previously existing symptom complex such as a post partum infection or it plays the part of a fixation abscess to a previously existing bacteræmia. In either of these events the presence of bacteria in the circulating blood must be referred back to the primary illness. This also holds true if a positive blood culture is obtained when the primary pneumonia is still in an active stage.

Exploratory aspiration. Exploratory aspiration has always been practiced in our hospital before operation for confirmation of the diagnosis. The procedure is not without danger and a certain number of accidents may and have happened. The most common of these were:

- 1 Subcutaneous emphysema
- 2 Pneumothorax
- 3 Hæmoptysis or less commonly albuminous expectoration
- 4 Pleural reflexes

The subcutaneous emphysema was usually absorbed in a few hours. Hæmoptysis or albuminous expectoration also never lasted for any length of time. An acute pneumothorax has given cause for anxiety more than once. Pleural reflexes are quite common; usually they are mild, occasionally severe enough to cause death. Among them we have noticed reflex disturbances in the cardiac or respiratory apparatus and in young children and infants on rare occasions generalized convulsions.

Dayton (35) has gone over this phase of the subject very thoroughly basing his observations on a large experience. He notes also these accidents which we have encountered and in addition the following:

- 5 Breaking of the needle
- 6 Infection of a serous exudate
- 7 Puncture of the diaphragm and intra-peritoneal organs or adjacent pathological structures as an echinococcus cyst
- 8 Hæmorrhage from an intercostal vessel
- 9 Other pleural reflexes as coma or paralysis

Pre operative interval The length of time that elapsed before these patients were operated upon is shown in the following table. It is most instructive to study the relation between the pre-operative interval and the resulting mortality.

DURATION BEFORE OPERATION

	Cases	Deaths
Under one week	57	37
1 to 2 weeks	91	24
2 to 3 weeks	46	10
3 to 4 weeks	3	7
4 to 5 weeks	18	3
5 to 6 weeks	9	1
7 to 8 weeks	13	
2 to 3 months	7	3
3 to 4 months	3	4
4 to 5 months	1	2
1 year	1	
2 years		

Most of the cases were operated upon before they had had their empyema for more than two weeks. It was very common to have patients the duration of whose empyema was several months. One patient had his empyema for one year, a second for two years.

One notes the gradual decline in the mortality the longer the pus has been present in the chest. That should not be interpreted as meaning that empyemata should not be operated upon until a late period. Such a course of treatment is conducive to the frequent formation of rigid uncollapsible cavities, to chronic sinuses with numerous dangerous operations, and in some of the patients to marked deformity of the chest. On the other hand, operation should not be done when the pus is thin and has been present only for twenty-four or forty-eight hours. The experiences of our hospital tend to show that the operative mortality is highest during this period, owing to various causes which are detailed in a later part of this paper. The fact that empyemata which have been undrained for a long time have a much lower operative mortality has also been noted by Werner (36).

TREATMENT

The various methods which have been followed in our hospital in the treatment of these patients is shown in the following table. They include aspiration, intercostal incision and thoracotomy.

METHODS OF TREATMENT

	Cases	Deaths	Improved	Not Imp.
Aspiration	5			3
Aspiration and saline irrigation	2			1
Murphy's treatment	7	2		3
Intercostal incision	21	1		
Thoracotomy—				
No rib specified	89	20	16	70
Fourth rib	2			
Fifth	3			
Sixth	4		1	
Seventh	31	6	3	3
Seventh and eighth	2	1		
Eighth	84	20	9	
Eighth and ninth	1	1		
Ninth rib	37	9	4	1
Ninth and tenth	3			
Tenth				
Not operated upon	6	6		

Aspiration Practically all of our patients were treated by operative measures. A very few were treated by various aspiration methods, especially since Murphy described the formalin treatment. As is seen in the table we have had uniformly bad results with aspiration or irrigation methods, except in very young children—those under two years of age. In these infants a certain number and that too a small percentage can be cured with repeated aspiration alone. Such a result has never in our experience been obtained in adults with any method of aspiration of the chest. Murphy's method has never given satisfactory results, and two of the patients treated with this method have died.

One patient who refused operation was treated by having the pleural cavity washed out with a 1 per cent solution of formalin until the return flow through a second needle inserted into the chest was clear. Each irrigation was followed by a rise of temperature and increase in the cough, which subsided in several days. After the third washing the patient said she was comfortable, had no temperature, cough or pain and remained so for four weeks and was thought to be cured until exploratory aspiration demonstrated that pus was still present in the chest. Still refusing operation she was sent home and returned later with an empyema necessitatis.

Intercostal incision As a rule, intercostal incision is not the operation of choice in our

hospital it is almost always the operation of necessity. We account for the high mortality of simple incision by the fact that all of these patients were in a most precarious condition when they came to operation so much so that on many an occasion a general anesthetic was not employed. About one half of the resulting deaths occurred immediately or within the first twelve hours the remainder before the end of forty eight hours. It is interesting to note that with this operation we had practically no trouble with the after treatment the patients either died or got perfectly well. The two patients who were discharged improved were referred to our out patient department with shallow sinuses.

Thoracotomy. Thoracotomy with rib resection is the operation of choice in our hospital. Whenever possible it is done and not infrequently in local anesthesia. Depending on the individual operators incisions parallel to or at right angles to the ribs were made and usually when a vertical incision was employed more than one rib was resected. Incisions over the fourth fifth or sixth ribs have usually indicated either (a) a localized empyema due to the rupture of an intrapulmonary abscess or bronchiectatic cavity or (b) an interlobar empyema. Depending also on individual operators the incisions were made to overlie the midscapular the posterior or anterior axillary lines and sometimes these were required owing to the location of encapsulated empyemata. The important point always seemed to be however that the drainage of the chest should occur at the most advantageous point and as long as this condition was satisfied the location of the incision was immaterial. Large openings were made and wherever there were large fibrinous masses in the exudate their removal was much facilitated by this means.

Drainage. Drainage was established usually with two large rubber tubes and an occlusive dry dressing was applied. The dressing was always made as air tight as possible by the judicious employment of rubber tissue. The patients were dressed as often as the amount of discharge indicated and the tubes were removed at the earliest opportunity.

Unfortunately the records are not complete as to the length of time the tubes were kept in.

We have followed the almost universal custom of establishing drainage with one or two large-sized rubber tubes. Tiegel (17) has designed a metal drainage tube with a valvular arrangement permitting egress of pus from the chest only. Floyd (20) uses a spoon shaped rubber tube in order to prevent the tube from slipping into the chest. Others use a collapsible tube which has a valvular action in that the tube collapses when any effort is made to suck anything into the chest. In 1897 Beck advised packing the entire cavity with gauze through a large opening. The latter method we believe unwise.

We have not had much encouragement from our employment of the various methods of suction drainage of the chest. It has seemed as if these aids to the drainage mechanism have not had any appreciable effect either in shortening the time of healing or in preventing the formation of chronic sinuses so that in our hospital these methods have not had the extended trial which has been accorded to them abroad. A recent paper by Dowd (24) confirms this experience.

Irrigation of the abscess cavity either during the operation or later at each dressing is not done in the hospital as a routine measure. It frequently has accounted for chills and high temperatures and marked discomfort with increase in the cough. We believe this procedure has a certain amount of danger.

Post operative course. In the favorable cases the course of the convalescence was not disturbed by any rise in the temperature after the primary operative reaction had subsided. The latter was usually equally well marked in both children and adults and it was no infrequent thing to see a temperature reaction up to 104. Rises of temperature after that were due either to retention of pus in the wound or to complicating or intercurrent diseases. The reactions then approached what the normal was for each illness. When no physical signs were found and there was no retention of pus in the wound the usual cause was a small area of consolidation deep in the substance of the lung and the temperature

hours Four patients died on the second and nine on the third day Twelve of these could truly be said to have died as a result of the operative procedure Our operative mortality was therefore 4 per cent There were thirteen other patients for whom no cause of death could be found except exhaustion from the empyema The mortality due to the empyema *per se* was therefore 8 per cent

Twenty per cent of the patients that is 70 per cent of those that died died as a result of some complication or intercurrent disease The causes of death as far as we could determine were as follows:

CAUSES OF DEATH

	Cases
By pneumothorax	2
Pneumonia	10
Pneumonia and pleural eff	2
Lung abscess	5
Pulmonary edema	4
Bacteremia	5
Middle ear suppuration	
Brain abscess	
Thrombosis of the lateral sin	
Tuberculous meningitis	
Cerebrospinal meningitis	
Acute endocarditis	
Acute sufficiency in bronchi	1
Nephritis	
Nephritic pulmonary edema	
Cholera infection	1
Malaria	
Interoculitis	
Carcinoma of the esophagus	1
Necrosis of the oral cavity	1
Actinomycosis	1

This brings the total mortality up to 28 per cent

The length of time after operation that the patient lived is shown in the following table:

LENGTH OF TIME AFTER OPERATION BEFORE DEATH

	Cases
Less than 4 hours	
1 day	4
1-3 days	9
3 to 4 days	1
4 to 5 days	6
5 to 6 days	
6 to 7 days	
1 week	10
1-3 weeks	1
3 to 4 weeks	1
4 to 5 weeks	
5 to 6 weeks	
6 to 7 weeks	4
7 to 8 weeks	
8 to 3 months	
3 to 4 months	5
4 to 5 months	1

The large number of deaths in the second week was due to the fact that most of the complications occurred at this time

There are several reasons why there has been such a large immediate mortality A certain number of the patients were admitted to the hospital in a most desperate if not hopeless condition One was usually surprised when nothing unfortunate happened Good results were often obtained with these patients by first drawing off the major portion of the pus with a Potain aspirator and waiting for the patients to recover from the profound collapse before subjecting them to thoracotomy Others were operated upon with the primary pneumonia still in active stage The added insult of an irritating anaesthesia was enough to give a fatal issue Many of our surgeons for this reason practice local anaesthesia as a routine measure in these cases reflecting the almost universal usage abroad in all chest operations The actual operative procedure opens up in the wound an enormous number of lymphatic channels inviting a large increase in the absorption of toxic substances The acute pneumothorax produced by the operation is accompanied with numerous pleural reflex disturbances which are often of a severe grade All of these have had a great deal to do in causing the large immediate mortality

FINAL RESULTS

Of the two hundred and ninety nine cases under consideration six were admitted to the hospital in a moribund condition and were not operated upon All of these six patients died Of the remainder fourteen patients were at first treated with some modification of the aspiration method Five of these were discharged well — all of these were infants or children two of these died and the remainder were later subjected to thoracotomy Two hundred and fifty eight patients were thoracotomized and of these 59 died 23 per cent Of those that did not die 50 did not heal properly after the operation and 28 of these had to have secondary operations of one kind or another The others were either discharged with fistulae and were not followed up or would not permit further operative inter-

hours Four patients died on the second and
 ference It was no infrequent thing for pa-
 tients to have their sinuses revised and
 reoperated more than once and even more
 than twice and not infrequently extensive
 thoracoplasties after the methods of Schede
Estlander or *Deformé* were necessary before
 healing was obtained The discussion of
 this phase of the question — the question of
 chronic empyema sinus — is reserved for the
 second paper of this series

RÉSUMÉ

1 Empyema is a very common disease and
 occurs much more frequently in children than
 in adults

2 In the vast majority of the cases it is
 secondary to some other inflammatory lesion
 in the body

3 The average mortality for our series was
 28 per cent varying from 50 per cent in in-
 fants to 18 per cent in adults

4 The least unfavorable period is between
 three and ten years of age

5 Twenty per cent of the patients die as a
 result of the primary illness, or of a recurrence
 of it or of some other complication or inter-
 current disease Only 8 per cent die because
 of the empyema and half of these die in the
 first forty eight hours

6 Twenty three per cent of the patients
 that recovered had more or less trouble with
 the healing of their wounds — one out of
 every four

Advances that will be made in the treat-
 ment of empyema will come from improve-
 ments in operative technique or in the after
 treatment, which will tend to decrease the
 frequency of chronic empyema sinus to a
 minimum or perhaps to eliminate it al-
 together

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URETERAL CALCULI SPECIAL MEANS OF DIAGNOSIS AND NEWER METHODS OF INTRAVESICAL TREATMENT

By J. T. GERAGHTY, M.D. AND FRANK HINMAN, M.D. BALTIMORE
From the Urological Clinic of the Johns Hopkins Hospital

THE normal ureter is not a tube of uniform diameter but presents three points of contraction. The first of these is located at the ureteropelvic juncture (2 to 4 mm in diameter) the second at the point of juncture of the ureter with the bladder (3 to 4 mm in diameter) and the third described by Albarran corresponds to the superior strait where the ureter bends into the pelvis (4 to 6 mm in diameter). It is at the level of the two extremities of the ureter above all where the calculi rest. In many cases however the ureteral orifice itself is so contracted that it may cause obstruction to the passage of a calculus which has succeeded in passing as far as the intramural portion. There are many factors which influence the migration of a calculus along the ureter. In some instances a calculus enters the ureter and is soon arrested by an abnormal contraction. In other cases the stone is rough or spiculated and catches on the mucous membrane or so injures this as to produce congestion or edema which prevents its passage. When infection occurs the reaction set up about the calculus may also cause obstruction. Again the calculus may be caught in a pouch formation or diverticulum. The variation in the contractile power of ureters and their varying degrees of sensitiveness to the trauma of the calculus also play a rôle in its passage.

In 49 out of the 67 cases in our series the position of the calculus was determined as follows:

In intramural portion	Per cent
Pelvic portion—	24.3
In lower ureter near the bladder	40.8
In lower ureter near the brim of the pelvis	8.3
	— 59.1
In iliac portion	2
In lumbar portion	4.6

Jeanbrau in a report of 204 observations on the position of ureteral calculi found that 17 per cent were in the intravesical portion

7 per cent in the iliac, 22 per cent in the lumbar and 51 per cent in the pelvis of the ureter. The vast majority of observers agree that most ureteral calculi are found in the pelvis or lower portion of the ureter. In Jeanbrau's series 96 per cent were unilateral and in 90 per cent of the cases one stone was present.

The symptoms of ureteral stone vary somewhat according to the position of the calculus. With stone in the upper end of the ureter the symptoms differ very little from the symptoms produced by stone in the pelvis of the kidney. A stone in the midportion or in the lower segment of the ureter is practically always associated with more or less typical renal colic and is apt to have symptoms of radiation down along the course of the ureter even to the genitalia of the affected side. Young has described a tripod of symptoms which he has found in several cases associated with stone in the intramural portion of the ureter namely urinary irritability, pain on ejaculation and pain on defecation. The pain may show unusual points of radiation extending down the leg and even into the heel as in one case. The character of the colic and the position of the pain in the vast majority of cases give no indication and bear no relation ship to the position of the stone. In rare instances when the stone is in the lower portion of the ureter the pain may be referred to this area alone. When pain is thus localized it is no positive proof that the stone lies in the lower portion of the ureter as it may be higher up or even in the kidney itself as the following case will illustrate.

The patient was a young man suffering with frequent attacks of colic in the right hypogastric region the pain radiating to the right testicle. There was never any pain in the kidney region. Radiography showed a stone in the right pelvis but no stone in the ureter. It is of interest to note

that on injecting collargol for a pyelogram colic was produced over the lower ureter similar to the previous attacks but no pain was felt in the kidney. A successful pyelotomy was performed and a stone removed from the pelvis but a careful search showed that there was no stone present in the ureter.

The size of the stone bears no relationship to the severity of the symptoms. Frequently severer attacks will result from a small calculus than from one which is of good size. Not infrequently calculi of moderate size are passed with comparatively little discomfort. A tiny stone on the other hand may be passed only after the most excruciating colic. Finally the presence of stone in the ureter is not necessarily associated with noticeable symptoms since some of them may be silent for many years the patient being entirely unaware of their existence. It is impossible therefore to make a diagnosis of the position or even existence of a ureteral calculus by the character and location of the pain. For the diagnosis we have come to depend almost entirely upon the data furnished by special methods of exploration and examination.

METHODS OF EXAMINATION AND EXPLORATION

Microscopical examination of the urine should precede in every instance instrumental exploration. It is very rare to find complete absence of red blood corpuscles in the urine on careful microscopical examination when stone is present. While the finding of evident or microscopical blood is no proof of the presence of a ureteral calculus its complete absence on repeated examination is very strong presumptive evidence of the absence of ureteral stone. The routine use of this very simple procedure will prove of extreme diagnostic value in certain cases.

Radiography. Of the diagnostic method at our command radiography holds the position of the most importance. This method for satisfactory results requires the skill of the most expert workers, skill both in technique and in interpretation because the sources of error are many. There is a great difference of opinion among these experts as to their ability to detect calculi. Most of them admit that pure uric acid

calculi cannot be detected. Lange considers it possible to detect about 95 per cent of ureteral calculi. Kümmel is of the opinion that calculi of all sizes and of any composition can be detected. In a study of our series of sixty-seven cases in which most careful and frequently repeated radiograms were obtained and only those accepted which were perfect it is possible to show that radiography missed the stone in fifteen cases or 22.4 per cent. In seven of these cases a stone was subsequently passed. In six other cases in which the X-ray was uniformly negative a wax tipped catheter gave positive evidence by a scratch of the existence of a calculus the diagnosis being confirmed in every case by either the subsequent passage of the stone or by its operative removal. In the remaining two cases stone was found on exploration. While undoubtedly even with the best plates stones are most frequently missed in the lower portion of the ureter not infrequently calculi are also missed in the upper or midportion. This frequency (22.4 per cent) with which ureteral calculi are missed by the X-ray is very much greater than is generally known and the percentage of calculi not recognized by skilled radiography is undoubtedly larger than our figures indicate because many cases of suspected ureteral calculi in which negative skiagraphs were obtained have not been included in this series no other method of verifying the negative X-ray findings having been employed.

In two cases with stone in the upper lumbar and in one case with stone in the pelvic portion excellent radiographs were negative. An analysis of the stones in two of these cases by Dr. George L. Pierce showed one to be largely composed of calcium phosphate and carbonate and the other of calcium phosphate and oxalate. In neither was there any uric acid. It would seem therefore that the chemical composition of the stone is not essentially responsible for the radiographic failure. The commonly accepted opinion that only uric acid calculi are apt to be overlooked is in our experience not true.

Extramural shadows. The presence of a shadow along the line of the ureter as a result



Fig. 1. Wax-tipped catheters and bougies. Single and double bulbs.

of a defect in the plate seldom causes confusion its nature is readily suspected by one familiar with these defects. The great frequency of shadows in the pelvis however close to the line of the ureter renders the diagnosis of ureteral stone in this portion particularly hazardous from simple X-ray alone. These shadows the result of phleboliths calcified glands or other extra ureteral cause are most often located opposite the pine of the ischium. A knowledge of their frequent existence render it necessary in the majority of cases to employ other method of diagnosis. For the purpose catheters with wire stylets or catheters (pique to the X-rays (in mouth) have been long employed in order to locate the exact course of the ureter. They furnish a rule sufficient evidence as to the intra or extra ureteral position of shadows. The filling of the ureter with one of the silver salts such as collargol or silver iodide has the added advantage that it not only outlines the course of the ureter and indicates the relative position of the shadow in relation to it but it also furnishes information regarding abnormal condition both of the ureter and kidney pelvis which may be of considerable diagnostic value.

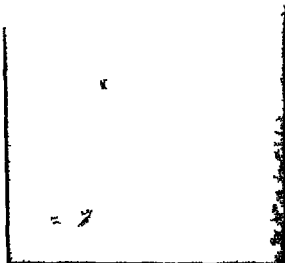


Fig. 2. Collargol retrograde pyelogram showing the ureteral pouch in which a stone lay and the wax-tipped catheter passed it without resistance.

Method of procedure when ureteral calculi are suspected but are not shown in the radiograph. For the demonstration of the presence of ureteral calculi the wax-tipped catheter excels in accuracy any other known method and should be employed in all suspected cases in which the radiograph is negative or doubtful. The wax-tipped catheter was introduced in 1893 by Dr. Howard A. Kelly for use in the female in conjunction with his open air method of cystoscopy. Burton Harris in 1912 adopted the method for use in the male through the modern closed system of catheterizing cystoscopes.

Technique for use of wax-tipped catheter. The preparation of the wax tip is simple and is effected by dipping the catheter in a melted mixture of equal parts of paraffin and beeswax upon withdrawal from which a small olive-shaped tip of wax congeals about the end. Sometimes two such wax bulbs are of advantage the second being located about 1 cm. from the end. This is accomplished after the end bulb has been placed and hardened by holding the catheter

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Extramural shadows. The presence of a shadow along the line of the ureter as a result

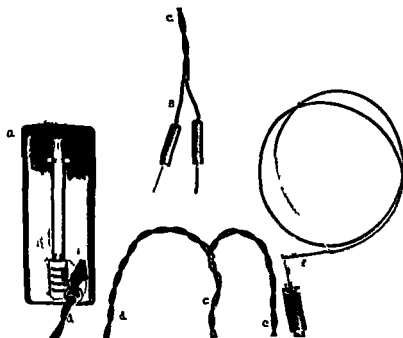


Fig 6 Apparatus for applying heat to ureteral wall thermometer b electrode c wire from electrodes b with wax tip d ureteral thermometer e ureteral thermocatheter f

cystoscope is passed along the urethra the catheter is gradually withdrawn by an assistant care being taken to leave the catheter projecting a few inches beyond the beak of the cystoscope as it enters the bladder. At no time must the wax tipped portion come into contact with the metal of the instrument. The catheter is withdrawn under direct vision until the wax tip appears in the cystoscopic field when it should be carefully examined to exclude the possibility of having been scratched by any of the previous maneuvers. The catheter is then introduced into the ureter as in ordinary ureteral catheterization. Subsequently the instrument is withdrawn first and then the catheter.

As a rule scratches produced by coming in contact with a stone are very definite and unmistakable. By the employment of this exceedingly valuable method during the last two years we have succeeded in diagnosing ureteral stone in six cases in which the X ray was completely negative in addition to confirming the suggestion of a stone in many doubtful skiagrams. This wax tipped method

of exploration can also be used to advantage in differentiating ureteral and extra ureteral shadows. In the many cases in which the wax tip has been employed in only one did it fail to demonstrate the existence of stone when present. In this case the X ray showed a very definite shadow in the lower end of

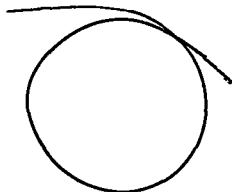


Fig 7

Thermocatheter f applying heat to ureteral

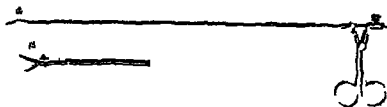


Fig 8 Cystoscopic scissors closed & open

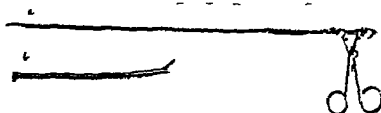


Fig 9 Cystoscopic knife closed & open

the left ureter and there was also present a history of typical attacks of colic. The failure of the wax tip catheter in this case was subsequently shown by a collargol ureteropyelogram (see Fig 2) to be due to the fact that the stone lay in a pouch and the wax end had passed without touching it. The occurrence of such conditions is very rare.

Revelation of stone by means of collargol
In occasional cases where the X ray fails to reveal a calculus it can be brought out on the plate by the injection of collargol. Several plates should be made at intervals after the injection (see Figs 3 and 4). As the silver salt leaks out of the ureter some of it adheres to the stone and in this way the shadow of the stone may be brought out rather distinctly. In one of our cases with typical colic the X ray was negative but the use of the wax tip showed the presence of stone and, by collargol injection of the ureter and kidney pelvis the shadow of the stone in the upper portion of the ureter was then clearly defined. In another case a very definite shadow was intensified. The stone subsequently removed in these cases were rather rough irregular and finely pitted (Fig 5). This method of revealing a stone

shadow by means of collargol or other silver salt may prove very valuable at times.

Cystoscopy The cystoscope will make the diagnosis in most instances when the stone is situated in the intravesical portion of the ureter. In three of our cases the stone could be seen lodged in the ureteral orifice itself. When the stone has not advanced as far as the ureteral orifice but lies in the intravesical portion there results a bulging of this portion of the ureter which can be readily seen with the cystoscope.

TREATMENT

The medicinal treatment of ureteral calculus occupies a very restricted field. Many drugs have been recommended at various times but with the exception of turpentine which has been used for many years and is strongly recommended by Watson no drug has proved of any particular value. Piperazin which is highly lauded as a uric acid solvent might be tried in cases of uric acid stone but the difficulty of being able to recognize the stone as of uric acid composition is at once apparent. The ingestion of glycerine in quantities of 2 or 3 ounces recommended by Casper has been absolutely futile.

The discovery of a small calculus in any portion of the ureter is no positive indication

from late negative γ activity because a study has that a large percent of these are spontaneously expelled. In cases where the examination is with the calculator the likelihood of error where the patient has no response or where the sample has been present over a long period of time without the passage of the calculated critical value, ratios

In ital cases with all cal u's m r
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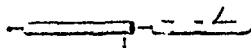
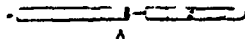
[illegible]

1. The first group of people who are interested in the study of the history of the United States are the people who are interested in the history of the United States.

1. *Chlorophyll a* (Chl *a*) is the primary photosynthetic pigment in most plants and algae. It is a green pigment that absorbs light energy in the blue and red regions of the visible spectrum.

The following table shows the results of the regression analysis for the dependent variable "Number of children per woman". The independent variables are "Age at first birth", "Married", "Urban", "Education", and "Income". The coefficients are estimated from a sample of women aged 15-49 years.

Variable	Coefficient	t-statistic	p-value
Age at first birth	-0.08	-1.2	0.23
Married	0.12	1.5	0.13
Urban	-0.05	-0.7	0.48
Education	-0.15	-2.1	0.04
Income	-0.02	-0.3	0.76

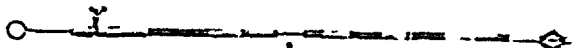
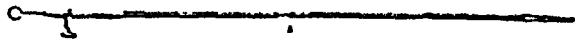


12 1 5 7 2 4 6 3

was a fair market value of \$100,000. Mr. Smith's interest in the partnership began in 1961, but the partnership was not organized until 1962. The partnership was a partnership for the purpose of the tax law.

[illegible][illegible][illegible]

1. *Phragmites australis* (Cav.) Trin. ex Steud.



orifice. When the stone lies farther up in the vesical portion of the ureter a method which has been found of practical value is as follows: A catheter designed by one of us (C) (Fig 10 A and B) with a small concealed knife at the tip is passed as far as the stone or a known distance. (It should not be passed beyond the vesical portion.) Then by traction on the wire as shown in B the blade is opened causing it to project through the anterior wall of the ureter and with the blade held open the catheter is withdrawn so that the whole anterior lip of the ureter is divided. This having been accomplished a ureteral probing designed by G (Fig 11 A and B) is passed beyond the stone if possible then opened and withdrawn. In one recent case a stone in the upper vesical portion was removed by this procedure.

Juxtavesical position of stones. When stones lie just beyond the vesical portion of the ureter manipulative procedures are not so uniformly successful as when they lie in the vesical portion. It should however be possible to facilitate or secure the passage of many of these stones when of small size by dividing the anterior wall of the vesical portion of the ureter and then dilating the ureter in front of the stone by means of the probing.

SUMMARY

The symptoms of ureteral calculi are not diagnostic and are insufficient to definitely determine either its presence or position except in rare instances.

While radiography is the simplest and probably the most valuable single diagnostic method for the detection of ureteral calculi even in the most expert hands surprisingly large percentage (22.4 per cent) may be undetected by it. The large percentage of failures demand the employment of supple-

mentary method before excluding stone with any degree of positiveness.

By means of collargol ureterogram a calculus occasionally will be shown which the simple X-ray failed to reveal.

The employment of the wax tipped catheter is by far the most accurate method for the detection of ureteral calculi and this method should be in more general use. In 17 out of thirty-five cases of ureteral calculi (48 per cent) seen in the last two years it has located a stone where repeated skiagraphs were uniformly negative. Owing to the great frequency of extra-ureteral shadows in the region of the pelvic portion of the ureter diagnosis of ureteral stone in this position cannot be accepted without confirmatory information.

A considerable percentage of stones which enter the ureter spontaneously and the discovery of a small calculus is not always an indication for immediate operative interference. Unless the stone is blocking completely or producing repeated and violent colic simple manipulative method should first be employed.

For calculi beyond the juxtavesical position displacement with the ureteral catheter in section of oil or the securing of relaxation of the ureteral wall by using the thermocatheter may in certain cases result in the expulsion of the stone. When the stone is in the vesical portion of the ureter cystoscopic procedures should usually be successful.

A study of our cases as well as different series reported in the literature shows that a considerable proportion (14.3 per cent) and H. 17 per cent of 204 cases (Jearnbraun) of ureteral calculi are arrested in the intramural portion of the ureter—a portion which can be readily reached by cystoscopic method. The methods therefore have an increasing field of usefulness.

SPINA BIFIDA TIBIAL TRANSPLANT FATHER TO CHILD¹

BY HUGH H. TROUT, M.D., ROANOKE, VIRGINIA

THIS case is reported on account of the ease with which a usually hopeless condition was simply and quickly relieved in one case and we regret not another spina bifida has reported to the hospital since this operation although before this time we had had seven. These seven cases both operative and non-operative present nothing new but simply the usual textbook cases of spina bifida meningo-myelocele and one case of spina bifida occulta two with and five without hydrocephalus. There is nothing unusual in the results of these cases or the character of operations performed so they will not be considered further.

The last case admitted however was a girl baby age eight months which reported to the Jefferson Hospital July 17 1914 and except for a rather large spina bifida was practically normal (Fig. 1).

The reflexes trophic changes etc. were uncertain and frankly we were not able to express an honest opinion on the part of the examination however the lower extremities were so weak the baby did not or could not move them but infrequently and only slightly whenever she did move them. The deformity was situated in the lumbosacral region and the age and weakness of the child made it almost impossible to ascertain correctly concerning the sphincter control.

The experimental and uncertain side of the operation to be undertaken was explained to the parent and after some difficulty their consent was obtained. On July 18 1914 an incision about 10 cm. long was made over the crest of the father's tibia and a rectangular piece of bone about 4x6 cm. and 2 mm. thick was removed by means of a circular saw leaving the periosteum attached and extending over each side for about 1 cm. In this manner the medullary cavity of the tibia was not entered. The graft was immediately placed in a pan of warm normal saline solution and kept there for further use. The father

left the hospital on the third day and had no trouble.

(To obtain an autogenous bone graft from any part of the child's body would have required too long a time and increased the danger. Animal bone-grafts are certainly not as apt to be successful as homogenous grafts.)

The baby was etherized and a transverse elliptical incision made over the tumor so as to have the incision removed as far as possible from the anus. The sac was readily exposed and the dissection was quickly carried down to the cleft in the spine. This cleft was about 2x5 cm. and situated in the lumbosacral region. An opening was made in the fundus of the tumor allowing about 300 ccm. of clear serum to escape. This exposure showed the various nerve roots radiating over most of the sac especially in the dorsomedian aspect. It was our intention to trim around these nerve roots as is usually done but each time we pinched or cut one of them with the scissors the child would stop breathing and become cyanotic. We then decided to close up the sac some distance from the ends of the nerve roots which we did with a continuous plain catgut suture and then shoved this collapsed tumor into the cleft somewhat after the manner of Schmidt held it in this position placed the bone graft removed from the father's tibia over it and anchored it by means of chromic catgut No. 0 suture. These sutures were placed through the periosteum of the graft the cartilage of the transverse and spinous processes and any other structure the curved needle would grasp. In order to prevent too much pressure on the collapsed sac the graft was bent like a bow and held in this position on all sides by suture. The skin was sewed up with fine black silk and silver foil cotton and collodion dressing was applied. Figure 2 and 3 illustrate diagrammatically the procedure and certainly the operation on the baby required less time than it has taken to explain it.

¹Read before the Southern Surgical and Gynecological Association, Asheville, North Carolina, December 3.



Fig 4 Before operation

The X-ray (Fig 4) taken before operation how distinctly the cleft in the lumbo-sacral region while Fig 5 taken four months after operation how the graft between the arrow. It can be seen that the growth of the bone in the four month has been rather extensive. The graft can now be readily felt in the baby's back.

In making these lantern slides it was necessary to retouch the graft in order to make it clear on the screen. In the original plates the graft is clear but when reproduced in the illustrations or slide it becomes indistinct unless retouched.

Figure 6 shows the baby standing by herself again in her crib and this in spite of having had a very severe gastro-enteric upset lasting over three months and due to the feeding of bacon etc. by the mother on the advice of a doctor.

In another case we would first aspirate fairly slowly the cerebro-spinal fluid for fear the too sudden relief of tension would cause damage to the ventricles of the brain. In addition to this it would not be necessary to sew up the sac but we would simply use the collapsed sac as a plug in the cleft after closing the hole made by the aspirator and thus prevent any possibility of leakage.

Of course where one has a sac already open and an infected field of some weeks



Fig 5

Fig 5 Diagram showing condition before operation
Fig 6 Diagram showing condition after operation

duration without signs of a meningitis he would naturally be able to insert a homogenous bone graft after inverting the sac but some experimental and clinical work which we have recently reported a regard autogenous bone grafts in infected fractures would I believe lead us to try with a reasonable expectation of success a tibial transplant from some member of the family to the patient. Briefly we found in rabbits autogenous bone-grafts took in nearly 80 per cent of the cases having active infection while with chronic infection the percentage was even higher.

This was also proved clinically in a few cases of infected fracture which were plated with autogenous grafts and pegs but not for one moment do we want to be understood as advocating any relaxation in aseptic technique such being the case with autogenous graft it is not unreasonable to expect a homogenous graft to take in a lower percentage and certainly most anything is better than to allow a continuation of a hopeless condition without even making an effort to correct it or to subject the patient to the usual long tedious flap operations attended with the shock of cutting the nerve roots etc.

Viewing spina bifida from the embryological standpoint one finds the condition due to the failure of fusion of the neural arches and it does not strike us as unreasonable to believe the cure is to be found in the applying of these neural arches even if we do have to construct them with an older homogenous



Fig 4 X ray taken before operation

Fig 5 X ray four months after operation

Fig 6 Shows child standing

bone-graft for such a method is as near as possible to nature's manner of completing a perfect vertebral column.

A search of over four hundred case reports in the Surgeon General's Library failed to disclose a report of any similar case which gave us hope that this case would prove interesting however at the same time we

realize the fallacy of advocating any departure from the routine on one case but we trust some of you will be sufficiently impressed to try the method and report results for we are convinced it is safer quicker and simpler than any other operation we have and worthy of a trial in those cases not associated with hydrocephalus.

ANURIA DUE TO UNILATERAL CALCULOUS OBSTRUCTION¹

BY LOUIS FRANK MD FACS LOUISVILLE KENTUCKY

SUPPRESSION not retention of the urine either partial or complete temporary or permanent may be due to a variety of causes and a complete study of the various causative factors is of more than academic interest Upon such study necessarily depends the treatment be it medical or surgical or be it the determination that our efforts will be unavailing and hence our policy one of watchful though hopeless waiting

The scope of this contribution is limited to a consideration of anuria due to calculous obstruction above the bladder and is further restricted to those of a unilateral type It has been our fortune to have observed five cases of total anuria in which the causative factor was calculous disease of one kidney only and it is this type with which we are concerned in this paper

Sir Henry Morris (1) chapter on calculous anuria must for all time remain a classic and upon this topic just as Tait in his chosen field he has said almost the last word on the subject But for the refinements developed in connection with cystoscopy and the improvements in radiographic technique the chapter might have been entirely closed

Kummel (2) divides anuria into what he terms a false and a true variety False anuria is due to obstruction from some cause the kidney performing its function although the purposes of it are not carried to completion Such instances are seen in bilateral calculous obstruction or in unilateral obstruction in the presence of a single functioning kidney Excretion of urine continues until the blood pressure is equalized and there is then established true or renal anuria As a matter of fact perfect equalization is not reached for many (14 to 30) days after the obstruction as evidenced by the oedema of the tissues surrounding such an obstructed kidney To this we shall refer later

Renal anuria may then develop secondarily or it may primarily ensue in (a) diffuse

nephritis (b) kidney tumor (c) disease of a single kidney the other being absent (d) from hysteria and (e) from reflex causes the latter being the most interesting from a scientific viewpoint Reflex renal anuria is to be suspected when with one kidney and ureter normal anuria sets in owing to the presence of disease trauma or obstruction in the other kidney and in such cases may be due to calculus tuberculosis hydronephrosis nephrectomy etc

So far as we have been able to ascertain there had been reported previous to the publication of Watson's (3) paper in 1909 only one hundred and sixty three cases of calculous anuria to which he adds including one of his own twenty five making a total of one hundred and eighty-eight cases We have examined the literature and have been able to add to Watson's collection only our own cases although doubtless others observed and reported have escaped our notice So it can not be assumed that unilateral calculous anuria is such an infrequent occurrence and we feel sure that the attention of the profession being called to the subject and the value of the X ray as a diagnostic aid being recognized the condition will not be so often overlooked

In our five cases the first although seen by three most excellent practitioners was not suspected as being due to calculus notwithstanding the history until I saw the patient on the fourth day after anuria developed Case 2 was treated for a week by one physician and the second being called on account of the absence of the first from the city led to a diagnosis Case 4 was treated by a young practitioner for four days for stomach trouble without a diagnosis which was later made by a gentleman who had knowledge of Case 1

Watson (4) gives the causes as (1) the blocking of the ureter of one kidney, the other being functionally incapable (2) the blocking of the ureter of a fused kidney or the

common stem of a fused ureter two kidneys being present (3) the blocking of the ureter of one kidney and the lessening of the function of the other by reflex influence the latter organ being normal or but moderately diseased. He expresses the belief that in the majority of cases of unilateral calculous anuria the unobstructed kidney is either destroyed functionally useless or congenitally absent.

Legueu (5) holds that in unilateral calculous anuria the patient has carried on existence with one kidney only i.e. that the unobstructed kidney is always diseased and the same view is expressed by Albertin (6) Merklen (1) and others. Legueu asserts that three factors were required (1) Long standing change in one of the kidneys which has caused a diminution if not suppression of its function (2) a recent or recently aggravated lesion of the principal kidney (the calculus) (3) followed by reflex inhibitory effect on the disorganized kidney.

He states that the disease in the unobstructed kidney may be very slight and consist of only epithelial exfoliation. How the presence of such slight evidence of disease is to be determined I am unable to understand. Sections taken post mortem or at operation of a kidney which has been subjected to cessation of function as a result of causes which I shall presently show must necessarily reveal microscopic pathologic changes. That in many instances the unobstructed kidney is the site of a definite lesion we feel sure and at times this may be quite marked but we are equally certain that this is by no means always true.

Gotz (7) produced experimentally total anuria by the ligation of a single ureter in dogs having two kidneys presumably normal. It is therefore not sufficient in assuming slight disease of the unobstructed kidney to demonstrate a lesion post mortem. The knowledge should be ascertained previous to obstruction. In two of the cases to be reported (Cases 1 and 3) the urine previous to operation indicated a normal kidney and since the operation the urine has been normal. Such findings would lead to the inference that such cessation of function may take



Fig. 1 (at left) Calculus from Case 1. Facsimile of stone in size and shape.
Fig. 2 (middle) Larger calculus from pelvis of kidney Case 2. The large stone was causing the obstruction.
Fig. 3 (at right) Renal calculus passed by two-year-old infant Case 5. This picture is slightly larger than calculus actually was.

place in a previously normal kidney the excretion from the other being suddenly blocked or obstructed.

What then is the cause of this essential or true anuria? In some experiments with reference to the results of ligation of one ureter (8) which were reported to this society at its Washington meeting the following observations were made. That a kidney might resume work even after obstruction of its ureter for six to eight weeks that for a period of from two to five days sometimes longer after ligation (obstruction) the surrounding tissues were oedematous the veins enlarged that after removal of the obstruction the urine filtered through the kidneys very rapidly (polyuria) that the unobstructed kidney became primarily intensely congested arterial then venous and very quickly hypertrophied.

These observations are confirmed clinically in our cases of calculous obstruction and seem to explain certain symptoms and probably in certain instances failure of the unobstructed kidney to functionate. Likewise the anuria occasionally following nephrectomy may in the absence of a mechanical obstruction find its explanation in the same causes. Kuster (6) as also Israel (13) believed that a vasomotor constriction might very rarely be the cause in such perfectly normal organs. Morris (1) in the presence of an even slightly damaged kidney would find a renorenal reflex as causative but deemed such a reflex insufficient in a perfectly healthy kidney. In ligation experiments the urine output of the unobstructed kidney is always at first moderately diminished due to the altered

circulation Based upon this finding and because of the tremendous arterial congestion in the kidney we have been led to believe that herein lies the cause of anuria in unilateral calculous obstruction patients This is doubtless the congestive reflex reflex congestion referred to by Israel in his thesis in 1888

One of the kidneys being put out of commission compensatory vascular activity in the other fills the afferent vessels with a volume of blood which cannot be cared for by the efferents This permits further over distention from the arterial side and leakage from the arterioles adds to the direct pressure on the veins further lessening the escape of blood (making a vicious circle) and mechanically as a result of this circulatory disturbance the kidney is overwhelmed with arterial blood thus interfering just as efficiently with urinary excretion as if the renal vein were ligated Complete interruption of venous escape produces anuria just as does permanent obstruction of urinary outflow from the kidney It requires in the kidney pelvis a pressure of only 50 mm of mercury to bring about equalization in the arterial flow and a practical cessation of excretion We would therefore offer this circulatory disturbance as the explanation of anuria in the presence of one obstructed and a second good and normal kidney

Before entering into a discussion of the recognition and treatment of unilateral calculous anuria it may be well to report our cases and in the discussion of them to call attention to some of the salient points bearing thereon Some of the pre operative histories cited may seem needlessly long and to contain matter of little importance but are given in detail to show the slight disturbances with which these individuals may complain previous to the development of symptoms due to the obstruction or to the recognition of its cause

CASE Mr A S age 42 occupation attorney date of first observation September 12 1912 His personal history in reference to his previous disease and family history good He has had no genito-urinary disease nor bladder disturbance at any previous time He has however at various

times had attacks of renal colic first on the right then on the left side These attacks were usually mild and have recurred at rather frequent intervals during the past seven or eight years He has found it necessary to take morphine only twice to secure relief Some blood and albumen were noted in the urine following two of these attacks but disappeared in a few days The quantity of urine was always normal during these attacks Small uric acid calculi were passed upon several occasions, the last being in June 1912 At that time a radiograph was made and it was reported there were three small calculi in the left ureter There is no history of his having passed these stones The right side was reported negative Following this he was seen by Dr Crofton of Chicago Illinois who made the diagnosis of uric acid diathesis

The present attack dates from September 4 1912 On that late he took a horseback ride thus being in usual form of daily exercise He returned from his ride very hot took a bath breakfasted rested and went to his office at eleven o'clock a.m. He had some nausea and dizziness for which he consulted his physician Dr Sidney J Meyers who prescribed calomel On September 5 6 and 7 he did not feel well, but made no complaint of pain nor could any history be secured (anything resembling an attack of renal colic there being no distress which could be referred to the kidneys) Examination of the urine September 7 showed nothing unusual the urine being normal as to quantity and characteristics in fact there were no symptoms referable to the genito-urinary tract On the same day (September 7) at four o'clock p.m. he passed urine normally When seen by his physician at eight o'clock a.m. September 8 he stated that he had not urinated since four o'clock on the previous afternoon when he had also several stools His blood pressure was between 30 and 140 mm Hg (It was taken daily from this time until the date of operation and never higher than 50) On September 9 he showed some mental distress no urine had been passed notwithstanding his physician had employed the usual methods to induce urinary secretion Easily in the afternoon a catheter was passed but no urine found in the bladder This was repeated five o'clock with similar result Temperature pulse and blood pressure normal Consultants were then called the patient was given a brisk purgation hot baths and sweating with large quantities of fluids and digitalis was ordered September 1 his history was the same that of the preceding day There was no urine pupillary changes no drowsiness or headache but there was a great deal of restlessness

The patient was seen by me the afternoon of September 8 There was some aching dull pain on the left side and on physical examination the kidney was apparently enlarged The bladder was empty In view of the history and findings the opinion was expressed that the anuria was due

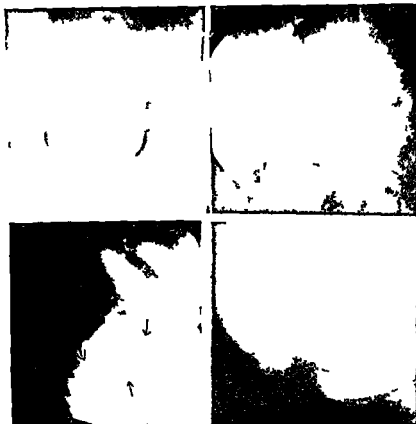


Fig 4 (upper left) Radiogram of pelvis showing no shadow in course of ureters. Picture twelve weeks after operation.
 Fig 5 (upper right) Post-operative radiogram both lumbar region. Case of calculus shown in upper left corner. Picture one week after operation. Stone had been passed.
 Fig 6 (lower left) Radiogram of left kidney. Case of four calculi shown. The plate was touched before printing.
 Fig 7 (lower right) Radiogram of pelvis of Case 3 showing calculus in the left ureter.

to unilateral calculus obstruction and that surgical intervention was imperative. This was delayed for certain reasons until the next afternoon viz September 2 and during the interval he was given Frisch's solution intravenously. He was prepared for operation without previously making an X-ray or cystoscopic examination. The reason for this was that the previous radiographic examination had shown stones on the left side and the physical findings and history located the obstruction on this side. The history indicated two kidneys and further was believed that little or no information could be obtained by cystoscopic examination.

The operation consisted of a nephrotomy done upon the left kidney under general oxygen anesthesia. An oblique incision was made in the kidney which was very large being merely brought into the wound and split apart from the superior to the inferior pole.

It was observed that the perirenal tissues were edematous and infiltrated with fluid to a tremendous extent confirming my belief that this was the obstructed side. As soon as the pelvis was opened there escaped about two ounces of urine mixed with blood. Palpation revealed no calculus either in the pelvis or in any of the calyces nor could a stone be palpated in the upper end of the ureter where it was within reach through the loin incision. A rubber drainage tube was placed in the kidney pelvis and around the gauze was loosely packed and the patient returned to bed the operation having lasted twenty-six minutes.

At 6:30 p.m. about an hour and a quarter after completion of the operation he voided five ounces of urine. During the next few hours he passed thirty-nine ounces per urethram and about forty-three ounces through the tube making a total of

about eighty ounces within the first twelve hours after the operation. During the next twelve hours there came through the drainage tube fifty three ounces of urine the amount voided not being measured. The quantity remained large for two or three days reaching the enormous total of one hundred and thirty four ounces from the obstructed kidney on the third day after the operation. During this time he was getting urotropin in large quantities of fluid. The quantity of urine then gradually diminished the tube was removed on the eighth day although drainage continued through the incision for three weeks longer. At that time the discharge from the back gradually ceased and a few days later he passed a small calculus per urethram, accompanied by considerable pain and some obstruction to the urinary outflow. This calculus had a diameter of about 3 mm. It was very regular in shape and had several sharp projections. It was brownish in color and moderately hard requiring considerable pressure with a knife blade to crush it. On the addition of acetic acid it showed a change but the mass was readily softened by a little soda. The microscope showed it to be composed of uric acid crystals. The drawing which is presented herewith shows the exact size and shape of the calculus. (Examination of calculus made by Dr. R. Hayes Davis.)

During the past two years since the patient's recovery radiographic examination has been repeatedly made of both kidneys, no stones being shown present. The urine has been normal as shown by numerous examinations and he has had no further attacks of a calculous nature. He is attending to his business daily and is perfectly healthy in every respect.

CASE. Mr. I. B. Griggs, a resident of Waukegan, Illinois, operation for his stone came under my observation July 3, 1913. Family history negative. Previous personal history. Had an attack of gonorrhea at the age of 17 followed by urethral stricture and was under treatment four years. With this exception has had no medical attention for ten years and has apparently always been perfectly well.

His present illness began on month ago with acute sharp pain in the region of the right costal margin radiating downward into the pelvis and around the right margin to the back. The pain became quite severe and morphine was necessary to obtain relief. In three or four days pain became progressively less and finally disappeared. The case was looked upon at this time as one of gall bladder disease and he was kept in bed for the next two weeks during which time he was free from pain but he had no appetite felt weak and tired with temper ture ranging from 98 to 100 F. About July 10 he entered the hospital where he was

treated for typhoid fever. During all this time he never saw any blood in his urine nor had he ever heard any doctor say it was present.

On July 12 he had acute cramplike pain in the right kidney region followed by the passage of a small amount of bloody urine since which time no urine whatsoever had been voided. He was given hot water enemas daily, an abundance of water to drink, cathartization was practiced but no urine was ever found in the bladder.

On July 13 he came under the care of Dr. F. W. Kochler of Louisville, who believing he had a calculous anuria at once had me see him. At that time he had a temperature of 102 F., pulse of 88, was much emaciated, lethargic and stupid difficult to arouse. There were no pupillary signs, no oedema nor any convulsion or other signs except headache and the mental symptoms indicative of uremia. Altogether he seemed most unpromising and by no means a good or safe surgical risk.

Radiograph examination showed the presence of four calculi in the left kidney, the right one being free floating but the kidney itself seemingly much enlarged. Blood examination showed 13,500 leucocytes, 4,250,000 red cells, 8 per cent haemoglobin and a pressure of 60 mm. Physical examination discovered a very large tender mass in the right iliac region and a large though painless left kidney. No urine was obtained by catheterization and no urine was voided. It was prepared for immediate operation but was first cystoscoped after being placed upon the operating table. Two ureteral orifices were noted. The ureteral catheter was passed into the left ureteral orifice which as a femtoun ad was then as far as the pelvis of the left kidney without difficulty. On the right side none or about 1 cm. from the ureteral orifice of this depth catheter met an impassable obstruction. The bladder mucosa appeared normal. Bilateral peritonitis was let removed upon the left kidney being operated upon first through an oblique incision. The ureteral calculi were removed from the left kidney pelvis by pyelotomy. This kidney was also decapsulated and the kidney capsule was split almost the distance between the two poles and peeled back. It was noted at the operation that the mucosa and perirenal fat were very edematous. The larger calculus the size of a small bean had completely obstructed the ureter and was lifted out of the ureteral orifice into which it was impacted. The kidney pelvis was drained with a tube guided by the catheter passed around the kidney. The right kidney was then exposed through an oblique incision five inches long. The structures on the right were not edematous. It was noted however that the veins of the perirenal tissues were greatly dilated, the kidney much enlarged and its capsule tense. The pelvis of the kidney was opened and found empty. The capsule was split and the cortex exposed over two thirds of its area. The perirenal fat was much compressed when first seen. A rubber drainage tube was placed in the kidney



Fig. 8 (left) Microscopic section left kidney Case 1 Interglomerularis

Fig. 9 Microscopic section Case Desquamitis nephritis Round cell infiltration left kidney

Fig. 10 Microscopic section of the right kidney Case 2 Acute suppurative nephritis

Note the round cell infiltration The section is taken at the site of small abscess

pelvis and one gauze strip was also introduced. There was considerable oozing from the ruptured veins. Both incisions were partially closed with interrupted silkworm gut sutures and a gauze dressing applied. The two operations under gas oxygen and anesthesia required forty four minutes for completion. Proctoclysis was started immediately after the operation the rectum absorbing large quantities of water. Within the first twenty four hours post operative there passed through both tubes a total of ninety ounces of urine in addition to a large quantity which escaped into the dressings. In the next twenty four hours the quantity was seventy ounces although again the dressings were thoroughly saturated requiring frequent changing. His temperature which had been 102 F before and 100 F at the time of the operation subsided to normal. Six days later it rose to 101 F in the evening ending to 99 F the next morning. Urinalysis at that time (July 24) showed urine turbid peculiar gravity 1.008 reaction alkaline light cloud of albumen no sugar no casts. A large number of pus cells were present and many large masses of pus cells a few red blood cells and epithelial cells. The leucocyte count was 400—93 per cent polymorphous 71 per cent lymphocytes—400000 red cells hemoglobin 80 per cent. Both drainage tubes were now removed and both wounds explored with the finger but nothing to account for temperature was found. The wound on the left side rapidly closed but the right remained open and lay raw. It began to discharge conical bits of pus and bits of pus. It also at that time oozed large amounts of pus from the bladder and on the 14th to 16th.

On July 31 there were present in his urine a few large pale granular casts many leucocytes phosphates and epithelial cells. On August 1 there was a large amount of pus in the urine phosphates and red. The patient had gradually grown weaker showing indication of im-

perature and was clearly septic. He died on August 3 sixteen days after the operation and twenty three days after the beginning of the anuria.

At the autopsy no gall stones were found present the left kidney was large and soft the right kidney showed an abscess which extended underneath the capsule the pus pocket being about two and a half inches in diameter and communicated by a small sinus with the kidney pelvis. There were also present numerous miliary abscesses. The upper portion of the right ureter was found dilated to the size of the index finger the dilated portion reaching to the brim of the pelvis from whence it was normal in size. The lower end was invaginated into the dilated upper portion which was filled with thick creamy pus. The left ureter was normal in appearance.

CASE 3 Mrs. M. S. age 60 was referred to me December 12 1913 by Dr. Sidney J. Meyers of Louville Her family history was negative. Previous personal history good. With the exception of malaria she had had no disturbance other than as hereafter mentioned. About 5 years ago he had an acute attack of cramplike pain in the left kidney region radiating to the bladder and the thigh. The pain was most severe and continued throughout the night and the following morning. During this attack she suffered from nausea and vomiting and a small amount of blood was noticed in the urine. During the following months she complained of a dull aching pain in the left side radiating toward the bladder which finally subsided and she had no further acute distress until the day before I saw her.

December 13 upon rising in the morning he voided a small amount of urine and shortly afterward persisted in belching began which was followed by sharp pain in the left kidney region radiating to the rest of the left side. At about 10 o'clock in the evening two or three spoonful of dark bloody urine which contained no urine had been obtained.

began following exercise and the symptoms which existed during the three or four days preceding the suppression may be assumed to be symptomatic of the impending total anuria. This patient complained of no colic at the time of the onset of symptoms and it was only when the intrapelvic pressure in the kidney became great that he began to complain of aching in the obstructed kidney.

The fact has been noted in all of our cases and this has also been borne out in the experimental work previously referred to that the compensatory work of the unobstructed kidney is always attended with decided increase in its size. We have also made this observation in experimental unilateral nephrectomies and have found in such nephrectomies as in ligations or obstruction of the single ureter that the enlargement of the kidney is permanent and that organ becomes hypertrophied.

Case 2 bears out the observations of many previous observers and would seem to lend much weight to the statement made by Morris that the most important clinical feature in cases of calculous anuria is the fact that it denotes the patient possesses only one functionally active kidney the other being absent or destroyed by previous disease. While we do not, as stated agree with this dictum still had we borne this in mind the result in Case might have been different. Undoubtedly this individual as shown by the autopsy must have had probably a previous temporary partial obstruction in his ureter. This is the only explanation for the tremendously dilated ureter and it would also serve to account for the right sided pyelonephritis which was evidently an old disease. His kidney infection on the right side preceded the calculous obstruction on the left and such a case would bear out the observations to which we have previously called attention. It is quite likely that there may have been a partial or temporary obstruction on the right side by the pus which was finding its way through the ureter and that this obstruction resulted in an acute exacerbation of the infection. A further observation in this case and one

which we have previously made on the operating table and to which attention has been called in a recent publication by the writer is that obstruction may occur in a ureter which is partially dilated by invagination of the undilated portion. In this particular instance it was in the nature of an intussusception. A right sided nephrotomy in this individual might also have saved his life. At the time in his post operative history when the temperature again began to rise it was not believed that he could withstand further operative intervention but had we known the condition of this kidney or had we suspected it I dare say further steps would have been taken to save the patient.

In discussing the symptoms of calculous anuria it would seem to us that probably the most important feature in connection with anuria of this kind is the absolute absence of any disturbance in these individuals aside from lack of urinary secretion. Usually a history of preexisting calculous colic may be obtained but this is not always the case and certainly in the very young would hardly be possible to obtain. It must be borne in mind that obstruction due to calculus may occur in the very young. Our own case is by no means either the youngest or the only one which has been observed in infants. Morris quotes two cases of Rayer's infants at the breast aged two days and eight days, who died in convulsions which were the result of small calculi.

Realization of the possibility of the causation of anuria should lead at once to a thorough cystoscopic and radiographic examination. However if this is impossible for any reason and even if such examination should be negative with a clear history and a fair presumption as to the cause of the obstruction operative intervention is urgently and immediately indicated. The fortunate outcome in Case 5 is certainly no argument in favor of postponement of operation. It may however be well after the stone has been located by the X ray or even if such cause of obstruction has not been clearly detected to pass or attempt the passage of the ureteral catheter. It may be impossible

as in Case 4 to introduce the catheter past an obstruction due to such invagination but the fortunate relief of the anuria in Case 3 would indicate that this method of relieving the patient may be tried. Krebs (9) in 1903 relieved anuria by such ureteral catheterization being able in his case as I was in my own to pass the catheter beyond the obstructing calculus. We were not at the time aware of Krebs' recommendation therefore so far as we were concerned the method was original. I am sure that in a goodly number of such cases the procedure might be followed by success. In our own case as has been said this patient has had no further symptom due to the calculi although she still has these same calculi resident in the ureter. I do not believe however such fortunate relief will be obtained should the stone be located high in the ureteral tract for reasons which are very evident although it is possible an obstructing stone may be dislodged from the renal end of the ureter by means of the catheter. It also seems to us that if for any reason immediate surgical intervention is not undertaken and it is impossible to pass the obstructing stone lavage of the unobstructed kidney through the catheter may be of some benefit in reestablishing kidney secretion. In addition to this purgation and depletion for the purpose of lowering blood pressure may be useful in attempting to restore the flow of urine. The present method in vogue of giving digitalis with large amounts of water and other diuretics is to be deprecated and condemned as they only tend to raise the blood pressure and make bad matters worse. Should relief be obtained by the foregoing plan later removal of the offending calculus should be insisted upon. In our own Case 3 repeated advice to this end has been unsuccessful.

Treatment should be promptly instituted. The mortality by non operative or expectant means is very high ranging from 70 to 80 per cent whereas in the cases which have been treated surgically the mortality is only half as great varying from 40 to 45 per cent. With earlier recognition and prompt surgical intervention I feel sure the mortality will

be even less. Even late operations have at times been successful. Demon (10) reports a case operated upon as late as the eleventh day and Chevalier (11) cites a case operated upon the fourteenth day both with recovery. Late in the obstruction some of these individuals may be saved as indicated by the fact that Paget's (12) patient lived twenty days with anuria and Russell (a 12) reports a case living twenty eight days with anuria both ending in complete recovery after relief of the obstruction (12). Notwithstanding recoveries after obstructions of such long duration it must be borne in mind that here just as in the obstructed bowel each day that the obstruction exists adds tremendously to the risk and minimizes in equal proportion the chances of recovery. While the obstructed kidney may resume its function even after a number of days it is not necessarily the case that it must do so even after obstruction of very short duration.

The nature of the operation to be performed is in some respects a matter of choice. *Speed* and *expeditiousness* are however quite necessary. The obstructed kidney must either be nephrotomized or pelviotomy should be done. Personally we prefer opening the kidney pelvis if this can be done quickly as the object to be attained viz the release of intrapelvic pressure on the blood vessels is just as thoroughly and permanently overcome in this way as by section of the kidney. There are also some dangers from hemorrhage both primary and secondary from nephrotomy which must not be ignored and which one does not consider in opening the kidney pelvis. Hence the latter operation is equally efficient in securing the desired results and is far less dangerous. Israel (13) has suggested and very wisely we think the great mistake of suturing a kidney which has been nephrotomized for the relief of obstructive anuria. The reason for this is very evident. Decapsulation of the obstructed kidney is absolutely valueless. We have ascertained this experimentally since operating upon Case 4. Decapsulation of the unobstructed kidney should such kidney not be extensively diseased and particularly should it be normal may restore the secretion

Radiograph showed both ureters and kidneys negative for stone. Blood examination leucocytes 16,000, haemoglobin 80 per cent. Blood pressure 6.30 p.m. 160 mm Hg next morning 140 mm.

Notwithstanding the X ray showed no shadows we believed this a case of calculous obstruction of the right kidney and an immediate operation was advised. Through an oblique incision the right kidney was exposed. The surrounding structures and the fatty capsule were very oedematous, the vessels dilated and prominent. The kidney was greatly enlarged, bluish in color, about three and a half inches in thickness, probably seven and a half inches in length and about four and a half inches in breadth.

It was impossible on account of the size and location of the kidney which extended upward to the eighth interspace to bring it into the wound. Its capsule was therefore split and peeled back on each surface to the pelvis. Three strips of gauze were packed loosely around the kidney and the wound closed with chromic catgut.

The operation was performed under gas oxygen anaesthesia and the patient returned to bed in good condition with pulse of 90, he very shortly regained consciousness. However urinary secretion was not reestablished and about twelve hours after the operation he began to show mild delirium. The next morning his temperature was 100°, pulse 98, respiration 22—blood pressure 128 mm Hg. He now began to show some oedema of the legs and feet and beginning oedema of the lungs which later increased very rapidly and was the direct cause of his death two days after the operation and seven days after the onset of his anuric symptoms. During the latter twenty-four hours of his life he had delirium, twitching, vomiting and other evidence of uræmia.

Unfortunately no autopsy was obtained but in view of the fact that this man had previously passed renal calculi and the clear history which he gave of the attack with all of the classical symptoms of anuria due to calculous obstruction I think there can be little doubt as to the cause of his anuria. We undoubtedly erred in this case in failing to open the kidney pelvis as it was very evident from the findings at the operation that the operated kidney was the one in which the obstruction existed notwithstanding the fact that no shadow was shown by examination of the wet plate of the single radiogram which was made. It is of course possible that better preparation of the patient preceding the X ray or possibly another picture might have shown the presence of a calculus which may have been very small. An autopsy would certainly have been interesting and it further seems to the writer based upon his past surgical experience in decapsulation of the kidneys that had decapsulation been done on the unobstructed kidney the tension might have been sufficiently relieved to have permitted return of the secretory function by this organ. We shall comment upon this later.

CASE 5 The history of this case was related to me by Dr W. H. Coleman of Louisville and is briefly as follows. A male child aged two began to cry and complain of pain in the right side. The pain persisted for one and a half days when the child ceased to complain and it was also noted that the child had ceased to pass urine. The catheter revealed no urine in the bladder. After four and a half days the child became unconscious and the next day began to show oedema. The eyelids became very much swollen and the eyes closed. The oedema extended over the entire body. No urine could be obtained by catheter.

Seven days and thirteen hours after the beginning of the suppression the urine began to pass in large quantities. The amount was not measured but there was no doubt as to there being polyuria. Consciousness reappeared, the oedema and other symptoms gradually disappeared and fourteen days later with some interruption in the urinary outflow and with evidence of much distress the child passed the calculus which I now have the pleasure of exhibiting to the society.

A study of these cases at once makes evident the marked difference in many essential respects as Morris has shown between calculous anuria and the suppression of urine produced from other causes. He called attention to the very distinct tolerant stage which these patients have and which may persist for a number of days varying from two to twelve or fourteen. There is no definite time which may elapse before the tolerant stage ceases and the final uræmic stage begins. In our first case this stage may have begun on the morning of the operation as indicated by the slight rise in the blood pressure and the mental discomfort which the patient began to have. The duration of the uræmic stage is also variable as certainly in the child (Case 5) although it had no convulsions its unconsciousness may have been of uræmic origin. It will be remembered that this unconsciousness lasted for three days during which time no convulsions or other evidence of toxic poisoning were manifest.

As indicated by the histories the anuria as a rule begins suddenly. It should be borne in mind however that there may be period of polyuria with recurrence of total suppression indicating that probably the stone has shifted or that some temporary alteration of blood pressure has occurred in the good kidney. In Case 1 the attack

began following exercise and the symptoms which existed during the three or four days preceding the suppression may be assumed to be symptomatic of the impending total anuria. This patient complained of no colic at the time of the onset of symptoms and it was only when the intrapelvic pressure in the kidney became great that he began to complain of aching in the obstructed kidney.

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to this kidney. Such restoration however should not be an excuse for failure to relieve the obstruction in the other kidney as unless this is done the obstructed organ will shortly be completely out of commission. Should any doubt exist as to which kidney or ureter is obstructed there is no objection to doing a bilateral operation. We think if pelviotomy is performed, the dangers are not increased and even if so is in no degree commensurate with the good which may be accomplished. Bilateral nephrotomy even may be desirable. It is by no means necessary to remove the calculus at the first operation and time should not be wasted in attempts to do so or in a search for the stone. Should the calculus be in the pelvis of the kidney or within reach in the upper ureter its removal would necessarily be a feature of the operation. Should a single calculus be present in the lower end of the ureter and the kidney pelvis be opened or a nephrotomy be done such a stone may be dislodged and pushed into the bladder by means of the ureteral catheter passed from above. Prolonged attempts or manipulations looking to the removal of calculi which may be present are unnecessary the reason for the operation being not primarily the removal of the calculi but reestablishment of the kidney function. Not infrequently and particularly should the calculi be small with reestablishment of kidney function and regression of the edema and swelling in the ureter especially should

the stone be single it will in all likelihood be passed onward into the bladder. Surgical intervention should however, in no instance be delayed more than forty eight hours no matter what kind of treatment may have been instituted previously and in some instances it should be delayed not so long. As Watson has well said absence of uræmic symptoms and an apparently good condition of the patient is absolutely no excuse for delay.

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SEROLOGICAL FINDINGS IN 100 CASES BACTERIOLOGICAL FINDINGS IN 50 CASES AND A RÉSUMÉ OF 679 CASES OF ABORTION AT THE MICHAEL REESE HOSPITAL¹

By J. T. LACKNER, M.D., Chicago

From the Nathan M. Reese Research Institute

I AM very greatly indebted to Drs. Banga and Frankenthal for the privilege of reporting 500 cases of abortion from their respective gynecological services at the Michael Reese Hospital. These cases dated from January 1, 1909 to January 1, 1913 and included every type of abortion threatened, incomplete, missed, therapeutic, criminal and abortion in progress.

Of these 500 cases of abortion, 496 occurred in married women, 3 in single women and 1 in a widow. Sixteen were between the ages of 16 and 20, 228 between 20 and 30, 196 between 30 and 40 and 47 between 40 and 50. One hundred and twenty-seven were nulliparae, 67 I para, 82 II para, 62 III para, 50 IV para, 30 V para, 32 VI para, 18 VII para, 13 VIII para, 5 IX para, 4 X para, 5 XI para and 2 XII para. Ninety cases occurred during the first month of pregnancy, 188 during the second month, 114 during the third, 57 during the fourth, 25 during the fifth, 11 during the sixth month. Three hundred and thirty-three had had no previous abortions, 101 had had one previous, 39 had had 2, 10 had had 3, 7 had had 4, 3 had had 5, 2 had had 6, 1 had had 7, 1 had had 10. Twins occurred once in the 500 cases.

It was very difficult to obtain a history of the active cause of the abortion and undoubtedly in many cases the history given was unreliable. Four hundred and eight out of 500 women were unable to ascribe any cause for the abortion. 18 said it was due to lifting heavy weights, 24 admitted a criminal abortion had been performed, 15 ascribed the abortion to overwork, 11 thought it was due to a nervous strain, 14 decided it was due to a fall. Other causes were enemas, application of mustard plaster to abdomen, use internally of oil of tansy, quinine and cathartics. In 4 cases the abortion was com-

plicated by fibrosis, in 2 cases by bicornate uterus and in numerous cases there were other malformations of the uterus.

As syphilis is considered by gynecologists to be one of the most common causes of abortion, a Wassermann test was done on 100 consecutive cases of abortion blood for the test being taken before the uterus was emptied when possible, otherwise not until 4 or 5 days after the anæsthetic had been administered to avoid any errors which might be ascribed to the other. In 2 cases a slight hæmolysis was found when blood for Wassermann was taken immediately after operation. These later turned out to be negative. Four cases out of one hundred gave a positive Wassermann reaction.

If syphilis does cause abortions at what time and in what manner is the foetus infected? In ten cases of abortion we examined the liver, spleen and heart of the foetus by Levaditi's method, but no spirochetes were found. The placental tissue showed no spirochetes. The maternal Wassermann was negative in these cases. Unfortunately we were unable to obtain a foetus in these abortions in which the Wassermann was positive. Trinchese (1) in reviewing his four years experience in the Munchener Universitäts Frauenklinik says that the spirochete is carried in the spermatid fluid although it has not been found there. However this is accounted for by the fact that it is almost impossible to find spirochetes in spermatid fluid because the latter is filled with sperm so that in the dark field sperms obstruct the view, further spermioplasm does not take stains. That spirochetes are present in spermatid fluid has been proved by injecting the spermatid fluid of syphilitic men into apes, thereby causing syphilis. Trinchese quotes Pini, Mulzer and Rochon who have seen primary lesions due to spermatid fluid. The

spirochæte is larger than the sperm as has been proved by Klingmiller Metchnikoff and Barmon. If it were possible for the spirochæte to enter the sperm why should that particular sperm impregnate the ovum? Again if the spirochæte should enter the ovum at the time of impregnation the former would prevent any further development of the egg. Reischig (2) in his article on congenital lues says that of 500 luetic women who have borne children only 0.78 per cent aborted. According to Trunche lues plays practically no rôle in abortions during the first four months of pregnancy. In the fifth month 1.6 per cent of abortions are due to lues in the sixth month 7 per cent and in the seventh month 20 per cent are due to lues. Two-thirds of luetic children are born in the 8th 9th and 10th months. Five per cent of luetic children are born at full term. The placenta is infected in 25 per cent of the cases according to Trunche in 50 per cent of these cases according to Mracek (3). The impregnated ovum is not infected early but lues spreads rapidly in the later months of pregnancy. Mercurial treatment begun after a diagnosis of pregnancy has been made 12 after six to eight weeks and continued throughout pregnancy usually results in the birth of a healthy full term child.

Therapeutic abortion was performed in nine cases four times for tuberculosis of the lungs twice in cases of uncompensated heart once in a case of chorea and twice in cases of pernicious vomiting of pregnancy. Therapeutic abortion was performed in cases of tuberculosis because according to Dr Frankenthal

1 Pregnancy is incompatible with tuberculosis. On this account tubercular subjects ought not to be permitted to marry.

2 Human placental tuberculosis is being found more frequently than heretofore and is therefore to be reckoned with.

3 While pregnancy itself has a baneful influence on tuberculosis labor and the puerperium have a worse effect.

4 If this is true pregnancy ought not to be interrupted in the second half because conditions approach that of a full term labor and the patient ought to be treated symptom-

atically and an attempt made to get a living child.

5 In latent tuberculosis rekindled by pregnancy the pregnancy ought to be interrupted at once.

6 All early pregnancies in tubercular subjects had better be interrupted.

7 Although we have had no personal experience with laryngeal tuberculosis yet literature teaches that pregnancy has a particularly baneful effect in this type of tuberculosis and immediate intervention is indicated.

The above conditions the *status presens* of the patient and individual considerations ought to determine our treatment. Thus for instance a tuberculous patient may be desirous of risking her life for the sake of obtaining a child although a therapeutic abortion is indicated.

The mortality was four in five hundred or a death rate of 0.8 per cent. Since January 1 1913 and up to March 1 1914 179 additional cases of abortion were treated in the service of Drs Banga and Frankenthal at Michael Reese Hospital without a death thus making a mortality of 4 in 679 cases or a percentage of 0.6 per cent. The four fatal cases are enumerated as follows:

CASE 1: No 38,902 Age 26 Admitted November 13 1909 Nullipara one miscarriage Patient was five months pregnant and bag of water had ruptured eight days previously. Physician had called who made an internal examination. Patient was examined vaginally for seven successive days before she was sent to the hospital. Six days previous to entrance patient had a bloody vaginal discharge with abdominal cramps chills and fever. Admitted to hospital with temperature of 102 pulse 126, respiration 28. White blood corpuscles 25,000. Patient expelled fetus and placenta at midnight of day she entered hospital, seven hours after admittance. She was treated conservatively with elevation of the head of the bed ice bag to abdomen, continuous Locke's solution per rectum. Crede's treatment applied to abdomen and brandy by mouth. Blood culture showed staphylococcus albus. Autogenous vaccine injected. Death occurred on the nineteenth day.

CASE 2: No 41,436 Admitted May 5 1910 Age 35 2 months pregnant VI para No miscarriages. Nine days previous to entrance began to flow following criminal abortion. Flowed profusely for three days when she had chills and fever 105°. Six days previous to entrance she was

curetted On the day following as there was no improvement she was again curetted. At this time she had a severe sore throat Patient was then brought to the hospital complaining of severe headache pain in abdomen temperature 103.2 pulse 136 respiration 26 The uterus was immediately emptied digitally Blood culture showed streptococcus Patient died on sixth day of streptococcal septicaemia

CASE 3 No 45705 Admitted January 3 1911 Age 32 Patient 4 months pregnant had been ailing for four months, and was bedridden for one month V-paro No miscarriages Delivered of twin pregnancy before entering hospital Admitted because of continued vaginal hemorrhage Uterus was emptied digitally and irrigated with 1/4 per cent iodine solution two days after entrance On the first day she had a temperature of 101.4 pulse 112 respiration 24 Temperature following curettage was 102.6° pulse 112 respiration 24 Given continuous Locke's solution per rectum head of bed elevated and ice bag to abdomen Quinine sulph grs iii q i d strychn sulph gr 1/60 t i d White blood corpuscles on ninth day 6 200 temperature 103.4 pulse 92 respiration 28 On seventh day there was no improvement and drainage was made through the posterior vaginal fornix Much clear serous fluid was obtained This was inoculated into guinea pig with negative results Patient died on forty second day of tuberculous peritonitis

CASE 4 No 51147 admitted October 17 1911 age 28 I para no miscarriages 3 months pregnant Two days previous to entrance passed clots of blood and had abdominal cramps She expelled the foetus 24 hours previous to entrance and had a profuse vaginal hemorrhage so she called in a physician who emptied the uterus with ungloved hand Three hours after uterus was emptied the patient had chills and fever She entered the hospital with a temperature 103.2 pulse 128 respiration 28 Uterus was emptied digitally 6 hours after entrance to hospital White blood corpuscles 18,000 The head of the bed was elevated Locke's solution given per rectum ice bag and Crede's ointment applied to abdomen and brandy and strychnine administered by mouth Patient died 18 hours after entering hospital

Thus of the four fatal cases one was treated conservatively and three actively and all were brought to the hospital in a moribund condition The first had been examined vaginally repeatedly without aseptic precautions the second had had two curettements the third had a tuberculous peritonitis the fourth had had a criminal abortion the uterus having been emptied with ungloved hand patient dying a few hours after entering the hospital

Of the 500 cases 359 (71 per cent) had no fever Under the term of fever are included those cases that reach 100 F (mouth) In 141 cases (28 per cent) there had been fever both before and after the abortion In 83 (16 per cent) there had been fever before the abortion and in 87 (17 per cent) there had been fever only after the abortion Of the 87 cases 52 had fever 1 day 19 for 2 days 3 for 4 days 2 for 11 days 1 for 18 days 1 for 34 days and 1 for 43 days Sixty per cent of the cases remained in the hospital from 5 to 8 days

The treatment of abortions at present is one that is causing much discussion among gynecologists throughout the medical world However the first point and one that is often overlooked is prophylaxis If the patient has a retroverted uterus bound down by adhesions if there is a malformation of the uterus if there are fibroids an endometritis or a prolapse of the uterus surgical treatment is indicated to remedy these conditions In pregnant women having a history of numerous abortions or having a positive Wassermann or a clinical picture and history of syphilis prophylactic antiluetic treatment is indicated Violent exercise and too active catharsis should be warned against in the early months of pregnancy

The following was the treatment for abortions as outlined by Drs Banga and Frankenthal for the above 679 cases In the cases of threatened abortion where there was less than one finger dilatation and only slight bleeding the treatment consisted in absolute rest in bed and no vaginal examination excepting the first one no brisk catharsis As medication there were given 15 to 20 grs sodium bromide four to six times daily A hypodermic of morphine sulphate gr 1/4 and atropine sulphate gr 1/150 In these cases the patient should rest in bed for two weeks A great percentage of women entering the hospital ward with a diagnosis of threatened abortion came from the very poor laboring classes They had their families and homes to care for and were therefore unable to give sufficient attention to their own needs Consequently many of the patients that had been tired over the period

of threatened abortion returned in a few weeks with a diagnosis of incomplete or inevitable abortion. In cases of incomplete abortion if immediate intervention on account of profuse hemorrhage was not indicated the cervix was dilated by inserting a tent for a period of eight to twenty four hours. The technique was as follows:

External genitalia were shaved and scrubbed. Vagina was cleansed with green soap and water and irrigated with 1:5000 bichloride of mercury solution. Then under aseptic precautions a tent was inserted. First the position and size of the uterus were determined by bimanual examination and a speculum was then placed along the posterior vaginal wall. A double volsellum was inserted into the anterior lip of the cervix. A tent was chosen corresponding to the findings on bimanual examination and was placed in the cervical canal and pushed up into the uterine cavity using very little if any force. After the tent had reached a point where it was flush with the external os or seemed to have entered as high as it would go a cotton pledget was placed posteriorly laterally and anteriorly to the cervix to keep the tent from slipping out of the cervix. If the original dilatation of the cervix admitted only a very narrow tent this process was repeated in 8 hours at which time there was maximum dilatation. Tents were kept in the uterine cavity for 24 to 36 hours. There were no complications following tent dilatation.

Amersbach (4) Aschoff (5) and Schauta (6) are opposed to the use of tents in dilating the cervix for according to their experiences the presence of the tent in the cervix for 24 hours was frequently followed by a salpingitis or a lymphangitis. They thought the tent dammed back the flow of the uterine secretion and thus was a great source of infection. They contended that the great difficulty in inserting the tent the pain on removing it and the danger of carrying organisms into the uterus from without were factors that were too potent to overlook. Werner (7) of Wert heim's clinic was opposed to the use of tents in dilating the cervix because of the great delay in securing dilatation. If immediate intervention was indicated the cervix was

dilated with Hegar's dilators or in the event of a very rigid cervix the bladder was reflected and the anterior lip of the cervix was split. Rapid instrumental dilatation was always very dangerous on account of the frequency with which the cervix was torn. These tears often extended into the broad ligament. After the cervix had been sufficiently dilated the uterine cavity was explored digitally in the following manner. The forefinger of one hand was placed in the uterus and the other hand grasped the uterus through the abdominal wall and guided it over the finger within the uterus. The placental tissue was freed with the finger using the side of the finger rather than the finger tip and removed with the placental forceps. The dull curette was used only when the placental tissue could not be freed digitally. After one was satisfied that the uterus was empty the uterine cavity was irrigated with $\frac{1}{2}$ per cent iodine solution. The patient was kept elevated in bed for 3 days and was given fluid extract ergot and hydrastis $\text{N} \times \text{V}$ tid for 2 days and was given a daily enema. On the fourth day the temperature pulse and respiration were normal if the abdomen was soft and there was no hemorrhage the patient was allowed to get out of bed. In 360 of the 500 cases the placenta was removed digitally in the remainder a combination of digital and instrumental was resorted to.

The above treatment is one that has caused much controversy. First should the uterus be emptied digitally or instrumentally or by a combination of both methods? Schauta (8) and Fuchs (9) are in favor of the digital removal of the placenta and membranes. Tscherning (10) and Patek prefer the curette. Bumm (11) Taussig (12) and Guyot (13) favor a combination of both digital and instrumental. Patek (14) and Tscherning think that too much force is necessary and too great dilatation of the cervix is required for the digital removal of the placenta. On the other hand instrumental removal of the placenta is always accompanied by great danger of rupture of the uterus and one never is positive when the uterus has been completely emptied with the curette unless one makes a digital examination. After the

uterus has been emptied the uterine cavity is irrigated with alcohol potassium permanganate iodine lysol or other antiseptic solutions. Patek thinks that the hemorrhage following the emptying of the uterus is a sufficient douche. However irrigation with hot antiseptic solution serves two purposes first it acts as a hæmolytic and second as an antiseptic. Traugott does not irrigate the uterine cavity in cases of abortion with fever on account of the great danger of spreading the infection. Some gynecologists pack the uterine cavity with iodoform or iodoform gauze for 24 hours after curettage.

At Michael Reese Hospital in those cases of abortion where there was severe hemorrhage the uterus was emptied immediately. In cases of abortion with fever the uterus was usually emptied within 24 to 36 hours despite the cultural findings. Only in rare cases was the conservative treatment followed. However this mode of treatment is not sanctioned by all gynecologists. Winter (15) in his article on prognosis and treatment of septic abortions makes the treatment of abortions with fever dependent on the bacteriological findings from the blood culture and from vaginal and uterine secretions. He thinks that in all cases of febrile abortion where the hæmolytic streptococcus has been isolated from the blood or from the uterus conservative treatment is indicated. The only exception is in cases of severe hemorrhage. In those cases where the hæmolytic streptococcus is found associated with the staphylococcus and colon bacillus one must resort to active treatment. If a pure culture of hæmolytic streptococcus is isolated from the blood stream or uterine cavity Winter's orders are to keep hands off make no vaginal examinations irrigations or curettement for every fresh wound causes new openings for infection. Traugott (16) is even more conservative and believes that every febrile abortion in which the streptococcus whether hæmolytic or not is isolated from the blood stream or the uterine cavity is a contra-indication for operative measures. Walthard (17) favors the expectant treatment when gonococci streptococci or staphylococci are present in the uterine cavity or blood.

With the above ideas in mind 50 consecutive cases of abortion were examined taking smears and cultures both anaerobic and aerobic from the cervical canal and from the posterior vaginal fornix. The cultures were obtained by means of a sterile speculum a platinum loop and in some instances by means of aspiration of vaginal and cervical fluid through a capillary tube. Cultures were made on human blood agar as well as ordinary media. Many anaerobic bacilli were found the most common being the following:

1 Curved bacillus — grows in minute colonies is motile and gram negative.

2 Small gram negative bacillus having a delicate almost imperceptible growth.

The following organisms were isolated.

	Pure Culture	Mixed
Streptococcus—		
Hæmolytic	2	8
Non hæmolytic	1	6
Staphylococcus aureus	5	12
Staphylococcus albus	7	10
Bacillus coli	2	7
Pneumococcus	0	2
Gonococcus	0	0
Bacillus acidilactici	0	1

In these 50 cases there was no mortality. Temperature ranged from 98.6 to 101. There were no complications. The highest temperature of 101 was in a case showing a non hæmolytic streptococcus and staphylococcus. In 34 cases there was tent dilatation and digital removal of the placenta. In 16 cases there was sufficient dilatation for digital removal of the placenta and membranes.

Dr. Warnekros (18) of the Königl. Universitäts Frauenklinik of Berlin examining 70 cases of abortion with fever found the streptococcus 25 times and the hæmolytic streptococcus 16 times. In 61 of 70 cases the organism was found in the blood stream. In most cases there was a mixed infection of streptococcus staphylococcus and colon bacillus. Winter found the hæmolytic streptococcus in 25 per cent of his cases. The non hæmolytic streptococcus was present in 16 per cent of his cases. Hamm (19) found in 116 cases 38.6 per cent of hæmolytic streptococci 20 per cent of non hæmolytic streptococci. Hæmolytic streptococci are also

found in uteri of women who have abortions without fever and in uteri of women in the non pregnant state. Winter found hæmolytic streptococci in 5 per cent of these cases. Von Franque (20) Schauta and Holzbach (21) are opposed to delay in emptying the uterus in cases where hæmolytic streptococci have been isolated. McPherson in reviewing 3 500 cases of abortion in the New York Lying In Hospital advises radical emptying of the uterus in every case of incomplete abortion. Warnekros thinks that the treatment should depend on the clinical findings rather than the bacteriological findings. In many cases the delay of 24 to 48 hours for a culture may be harmful to a patient. Von Herff (23) Keller and Pfannenstiel favor immediate emptying of the uterus in every case of abortion independent of temperature.

The low mortality of less than 1 per cent in 679 cases in which one of the fatal cases was treated conservatively and the other three actively—one dying of tuberculous peritonitis and the other two entering the hospital in a moribund condition—is without doubt a strong argument in favor of the active treatment of abortion.

In closing I again wish to thank Dr Frankenthal for his keen interest in supervising my work and in suggesting this paper.

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TUMORS OF THE MEDIASTINUM¹

By W. D. HAINES, M.D., CINCINNATI, OHIO

THE classification of tumors is one of the most changeable and unsatisfactory chapters in surgical pathology. Each textbook contains a different classification and each author like the housewife with her sewing machine, thinks he has the best. There is, however, an encouraging note in the wide discrepancies contained in books published within the quarter of a century just passed, in that with the increase of our knowledge concerning causal factors in the production of tumors there has come a

gradual diminution in the number of morbid conditions formerly known as tumors. This better comprehension of production of tumors has resulted in the combining under one head of a number of conditions which were formerly considered as independent. Uppermost in this evolution is the recognition by investigators that tumors are made up of tissues normally present in the human body. The new growth is but a new arrangement of old structures. This does not imply that the new growth is made up of tissues identical

with its immediate surroundings but that the component parts may be found existing normally in the body—chondromata occurring in glandular tissue dermoid cysts of the ovary and numerous other examples will come to mind wherein totally unlike foreign tissue has been found in tumors but upon examination we find such foreign tissue exists as such elsewhere in the body and we leave to the imagination the task of explaining the presence of such tissue in an unusual location.

By far the greater number of intrathoracic tumors are located in the mediastinum save aneurism nearly all of them have their origin in the glandular tissue contained in this space. Neoplasms of the chest occurring outside the mediastinum usually involve these spaces in the course of their development. While it is manifest that the site of the tumor will dominate the clinical manifestations which accompany its development and determine the line of treatment to be instituted still more importance attaches to determining the true nature of the growth and the effect it will probably produce upon the surrounding structures. The scheme of diagnosis therefore should include careful consideration of the early and more or less obscure symptoms embracing muscular pains, irregular heart action difficulty in breathing or swallowing spasmodic affections of the laryngeal muscles and pleuritic irritation and cough with or without effusion.

The following case illustrates some phases of mediastinum tumors.

The patient a merchant age 57 years could not recall having had any serious illness until within the past six months at which time the present trouble began. He has had to get up once or twice each night for the past four or five years to urinate. Six months ago he weighed 235 pounds which was about his average weight today he weighs 170 pounds. Four months ago he began to have a distressing cough although he could rouse nothing from the lungs. He sometimes vomited during the effort and this was followed by marked relief. Shortness of breath had caused the patient practically to abandon his business affairs. He had taken much medicine including iodides without benefit. On more careful questioning the patient said he had had pain between the shoulders for a year or more. This was increased after eating or on lying down and especially made worse by rapid walking or lifting. He could not lie on the left side.

Physical examination revealed a mottled brownish discoloration of the skin with prominent veins. The left chest seemed to be slightly fuller than the right the supraclavicular glands on the left side were large and movable but not tender, there was a slight bulging at the suprasternal notch light pressure at this point caused an intense coughing seizure following which the patient was hoarse until after taking a sip of water. There was dullness over the left chest which extended as high as the sixth inter space with the patient in a sitting posture. This dullness changed with a change in the posture of the patient. Dullness behind the sternum extended a short distance to the right and was continuous with the heart dullness on the left. The breath sounds over this area were absent and they were indistinct over the rest of the left chest below the scapula. The heart action was rapid and irregular but no valvular disturbance was detected.

Protracted cough and rapid loss of weight had caused my consultant to regard the case as one of tuberculosis but the absence of fever and the fact that no rales were present although the disorder had been going on six months made it seem more probable that some more serious disease was causing the pain which had been persistent from the beginning.

The apical dullness was readily explained by the presence of the enlarged glands and the absence of fever and local muscular spasm would rule out a high Pott's thus narrowing the probable limits of diagnosis to two conditions—aneurism or tumor.

The rapidity with which emaciation had taken place (he had lost 60 pounds in six months) caused me to favor malignant growth in the mediastinum as the most probable explanation of the symptoms and physical findings. Fluid aspirated from the left pleural cavity was clear and the X ray showed a distinct shadow extending from the suprasternal notch downward a distance of 2½ inches and projecting beyond the margins of the bone.

The growth was removed by subperiosteal resection of the inner end of the left clavicle and attached muscles. It was made up of a number of enlarged lymph glands rather loosely held together. Little difficulty was encountered after exposing the mediastinum as the mass was shelled out easily by means of the finger and scissors.

There was very little hemorrhage at the time of operation and save a troublesome leakage from a large lymph-duct probably the left jugular the patient made a smooth recovery and lived two years after the operation dying of some brain trouble. An autopsy was not obtained. The laboratory reported the growth as a lymph sarcoma.

Another case may also prove of interest.

A man 55 years old, presented a history similar to the foregoing and was in *extremis* when admitted to the hospital. We attempted to remove the growth by the method outlined above but owing to the intimate attachment of the tumor to the

trachea complete removal was impossible. The growth which sprang from the remains of the thymus, had permeated the entire thickness of the tracheal wall and showed vegetations on the lining surface. The tracheal rings had been destroyed by pressure permitting the walls to collapse to such a degree as almost to occlude the lumen.

As in the preceding case herein reported the method of attacking this growth gave a very good exposure and we succeeded in removing part of the tumor before it became manifest that complete removal would necessitate resecting a segment of the trachea. The patient died within the next 12 hours and this specimen was removed after death. The growth is a sarcoma.

For our purpose we may arbitrarily divide these growths into benign and malignant tumors the former group including aneurism, gumma and tuberculosis the later including sarcoma and carcinoma. Other morbid growths occur in this region but the above are the more frequent varieties and all sufficient for consideration in a twenty minute paper.

Conclusions founded on observations of the natural history of these several growths will best serve us in their early recognition and differential diagnosis. Some of these growths run a much more rapid course than others some present marked constitutional symptoms and serious impairment of the general health long before symptoms referable to the chest manifest themselves.

Recognition therefore of the wide difference in the general aspect and progress of intrathoracic growths, aside from the special features which in no small measure characterize each case becomes paramount in the diagnosis, prognosis and management of these growths. Malignant growths for instance as a rule grow much more rapidly than the benign ones destroying life in from 12 to 18 months. A notable exception to this rule is found in lymphosarcomata springing from the posterior mediastinal glands or remains of the thymus. Such tumors may attain an enormous size and the patient live a long time death finally resulting in consequence of metastases.

Growths springing from the connective tissue in the mediastinum—sarcomata—may attain considerable size without producing symptoms this being due to the laxity of the

tissue and the ease with which enlargement may take place in all directions. To the writer's mind this is a valuable point to remember in attempts at localization of chest tumors. The site of the aneurism is more or less fixed, and you will recall that it is in this type of case that we encounter those enormous deformities of the chest including bulging erosion, and fracture of the bony cage. Extensive deformity occurring relatively early in the history of intrathoracic neoplasms may be induced by implication of a bronchus which causes collapse of the corresponding lung and compensatory expansion of the opposite side. Derangements of the circulation are constant concomitants of mediastinal tumors they are caused not alone by external pressure upon the vessel walls but also by the inherent tendency of sarcomata to permeate the walls of the veins, thereby inducing partial or complete occlusion and metastases. The effects are manifold finding expression in edema, metastases, hemorrhagic effusions into the pleura, pulmonary and cerebral apoplexy, gangrene and death.

Although functional disorders of the heart with modified rhythm and sounds without discernible valvular or muscular impairment are the usual findings cases are recorded in the literature wherein the heart has been involved in a similar manner to those rare cases of malignant breast in which the disease by extending through the thoracic wall affected the heart. Pain in some degree is usually present but the chief complaint of the patient suffering of mediastinal tumor will be of his inability to get his breath, the pain, cough and aphonia are annoying but the dyspnea is persistent and terrifying filling the patient's mind with ominous forebodings. The most prominent of the subjective symptoms is characterized by a wide discrepancy between the amount of exertion and the respiratory disturbance for instance the writer has seen a patient the subject of a mediastinal growth who had been sitting in perfect comfort bring on by merely walking across the room a violent spasmodic coughing seizure and serious respiratory embarrassment.

From what has been said it becomes ap-

parent that no one sign or symptom or hither to described order of phenomena can be said to be pathognomonic of a certain intrathoracic growth. The cases vary widely but by eliminating the ordinary forms of disease in a patient suffering of serious derangement of the mechanics of the chest one is warranted in making a presumptive diagnosis of mediastinal tumor.

In the differential diagnosis aneurism stands out preeminently for first consideration. The physical signs of aneurism comprise a loud murmur or splashing sound accompanied by a purring thrill which is imparted to the hand of the examiner when placed on the chest and interference with arterial circulation, delay, feebleness or absence of the radial brachial or carotid pulse. Interference with the return flow is common to both aneurism and solid tumors occurring much earlier in the history of the latter than in the former.

Retardation of the radial pulse on one side may be observed in cases where an aneurism is situated distal to the origin of the great vessels given off by the aorta. Sphygmographic tracings are of signal value in the differential and comparative tracings should greatly aid one in definitely fixing the site of the aneurism.

Symptoms dependent upon pressure manifest themselves later in aneurism than in other growths but aside from this possess no particular difference which would serve as aids in the diagnosis. The physical signs of aneurism like those of other intrathoracic growths will vary with the time of observation if the subject of an aneurism presents himself at a time when there is a considerable degree of elasticity in the sac wall and above all at a time when fluid contents fill the sac the classical expansible tumor peculiar vibratory thrill and loud tumultuous sounds render diagnosis easy quite different however are the signs after layer upon layer of clots are deposited upon the inner surface of the sac. Instead of a resilient sac we now have to deal with a thick rigid wall which limits the production of sounds interferes with their transmission to the ear of the examiner and presents the characteristics of a solid tumor.

Although sarcoma is the prevailing type of malignant tumor found in the mediastinum carcinomata are found sufficiently often to enable us to summarize their leading clinical features. Primary carcinoma in this region has in the writer's experience more frequently begun in the gullet than elsewhere and the symptoms are those of a slowly but steadily increasing difficulty in swallowing solids are first discarded and in the course of a few months the patient rapidly succumbs if not relieved by surgical measures.

Sarcomata in their early history are painless and increase in size slowly. Owing to these facts the patient does not present himself until pressure symptoms—cough hoarseness or dyspnea—drive him to seek counsel.

Rapidly growing tumors like gummata are painful very early in their course and pressure symptoms irregular pupil aphonia and dilated surface veins and serious night heart embarrassment soon follow. Growths in the anterior and superior mediastinum are in a measure distinguished by pressure exerted by them upon the superior cava and innominate while interference with the inferior cava or azygos would suggest the presence of a tumor in the posterior mediastinum. Implication of the venous circulation, chromotor roots of the sympathetic recurrent laryngeal or pneumogastric relatively early in the history speak for solid tumor as contrasted with aneurism which always shows symptoms on the part of the arterial circulation long before venous stasis becomes manifest.

Tuberculous adenitis leading to caseation and abscess affect this region and the enlarged gland must be differentiated from other growths. This condition like gumma, is ordinarily not difficult of recognition as in either instance we are dealing with the local expression of a disease which has almost innumerable general symptoms a sufficient number of which are usually present preceding the central chest lesion to readily distinguish them from other conditions found in the mediastinum. Finally we possess valuable therapeutic tests which will aid in the differential diagnosis of both tuberculous and luetic growths.

Patients dead of sarcoma of the mediasti-

num are singularly free from metastases. Money, an English pathologist, posted a number of bodies in which the disease was wholly confined to the mediastinum and the writer's experience in the dead room tends to confirm this view. If this observation proves true in any considerable proportion of the cases of sarcoma originating in the mediastinum it should encourage surgeons in their efforts to relieve by operation a condition which has hitherto been regarded as well nigh hopeless.

Numerous methods have been devised for exposing the anterior and superior mediastinal spaces. They include trephining, osteoplastic flap and longitudinal division of the sternum. These and other operative procedures were devised with a view to dealing with aneurisms.

Bardenheuer separated the muscles subperiosteally from the clavicles and manubrium and then by dividing the clavicle and first rib on one side he was able to remove a growth from the mediastinum. The writer has employed this method in two instances, and while a fair exposure of the field is obtained there are certain obstacles which should be regarded before attempting the operation. The chief objection lies in the liability of injury to the pleura. Damage done to the circulation in the course of the operation renders the field more susceptible to infection and lastly the operation is technically difficult.

The operation devised by Milton for exposing the mediastinum is less complicated and free from these objections and it gives a more satisfactory exposure of the field for operation. He divided the sternum longitudinally throughout its entire length in order to remove a foreign body from the

right bronchus, which he successfully accomplished.

American surgeons notably Curtis with a view to avoiding injury to the pleura have modified the operation by limiting the division to the manubrium at which point the pleura is widely separated.

As modified the procedure consists of an incision which is carried from the larynx downward in the midline to a point opposite the third interspace. The sternohyoid and the sternomastoid muscles are detached subperiosteally and are well retracted while the manubrium is being divided longitudinally. In sawing through the bone the saw should discontinue on reaching the periosteum covering the posterior surface and a chisel should be inserted to pry the severed margins apart. This enables one to divide the periosteum safely under the guidance of the eye.

Majors' blunt pointed scissors are well adapted for dividing the periosteum. The margins of the divided bone may be retracted two or two and one half inches permitting the free introduction of instruments and fingers. In doing the operation the chief structures to be avoided are the pleura and the internal mammary or its branches. Division of the latter will cause hemorrhage, which is difficult to control.

The writer's experience with the Milton operation has been limited to the cadaver. However the exposure obtained by this method will permit one to ligate the innominate carotid or subclavian and deal with operable neoplasms in this region.

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PERIOSTEAL REGENERATION OF BONE

By FRANKLIN D. SMITH, M.D., CHICAGO

DUHAMEL the French naturalist in 1739 first advanced the idea that osseous tissue was a direct derivative of the periosteum. By placing a silver wire or ring under the periosteum in a living animal and again examining some weeks later he observed that bone had completely surrounded the ring. Thus proliferation of osseous tissue lead him to infer that periosteum produced bone. Duhamel's ring experiment is the oft quoted classical experiment of the proof of the osteogenetic power of the periosteum.

Dupuytren and Cruveilhier attribute osteogenic properties to the periosteum while Virchow in 1858 states that the bone-cells are derived from the periosteum by a process of metaplasia. Gegenbauer in 1864 confirmed these views and gave the name osteoblasts to the cells in the osteogenetic layer.

Among the foremost earlier investigators in this field of research is Ollier who in 1858 and subsequent years supported Duhamel's theory. From his excellent experimental studies and accurate observations he concluded that all transplanted bone including the periosteum remains alive and ascribes especial importance to the osteoblastic layer of the periosteum. He gave preference to living bone which is covered with periosteum for transplantation. He went much farther however and added another function to the periosteum besides its inherent virtue of regeneration of bone and concluded that bone denuded of its periosteum would undergo necrosis and act like a foreign body becoming absorbed. After absorption it was replaced only because of the direct contact with the osteogenetic walls of the wound.

Barth (1896-1908) concluded from his experiments that all transplanted bone whether with periosteum or completely uncovered eventually died and bone regenerated from living bone in the immediate vicinity. These conclusions are directly opposed to those of Ollier. Considerable difference of opinion exists in the literature concerning

the periosteal regeneration of bone since the publication of Barth in 1896.

These early and conflicting experiments aroused a lively discussion which assumed greater proportions as the transplantation of bone became more popular among surgeons since it raised a vital question as to just how much attention should be given to the periosteum. A keen interest in these problems have lead to considerable experimentation and many followers both pro and con.

A short résumé of the literature will be given no attempt being made to discuss any conclusions.

Frangenheim (1910) ascribes a limited influence to the periosteum in producing bone but admits that it plays a relatively insignificant part in the process of regeneration.

Macewen (1912) in his book on *The Growth of Bone* summarizes the functions of the periosteum as follows:

The periosteum is of great use in limiting within specific boundaries the distribution of the osteoblasts and preventing them during the evolutionary period from being scattered into the soft tissues where their presence would be prejudicial to the function of these parts. In the loose areolar tissue existing between the periosteum and the bone the osteoblasts find nutriment for their growth and space to regenerate free from undue pressure. While not underestimating the periosteum as a limiting and protecting membrane of great use in physiological and pathological conditions there are no data at the present time to indicate that it can of itself secrete or reproduce bone. It has no osteogenetic function.

These views as yet can hardly be accepted. Adams has expressed the general consensus of opinion very tersely in a footnote in the last edition of his *Pathology* as follows:

We are not as yet prepared to accept those views holding the opinion that these observers have dealt only with the outer fibrous layer and not with what may be termed the cambium or mother cell layer in immediate contact with the actual bone.

Murphy (1912) without any experimental data to substantiate his statement believes

that bone free from periosteum is always absorbed in heterotopic transplantation

Baschkirzew and Ietrow (1911) in a very interesting article concerning the regeneration of bone admit that the periosteum is of value in the clinical application of bone transplantation not because of its power to regenerate bone but rather because of its aid in directing bone growth and serves to protect new bone. They also state that new bone is produced by periosteum only sooner or later to be absorbed completely.

Lobenhoffer (1910) from his experiments concludes that in transplantation of bone covered with periosteum the bone transplant dies completely but that the periosteum retains its inherent vitality.

In summarizing the work of Axhausen (1908-1911) it is readily seen that he assumes the position that neither bone alone nor periosteum *per se* is osteogenetic. Some of the bone dies but a portion of it retains its vitality. Periosteum and marrow substance remain alive and produce new bone. There is no material difference in homotopic transplantation of bone whether the transplant is dead or alive or whether it is or is not periosteal free but the chances are far more favorable of successful regeneration if it retains its vitality and is covered with periosteum.

Trinca found in his experiments on rabbits and dogs that in free periosteal transplantation bone was formed from the periosteum. He also emphasizes the importance of blood clot and bone-particles as a stimulating material for bone formation from the lower layers of the periosteum. A lack of these stimulating substances is associated with a decreased activity in proliferating power. He refers to an article by Bonhomme in which the same results are recorded.

Carrel (1912) was able to reproduce bone from periosteum after it has been grown in his special medium. The artificially growing periosteum was transplanted into subcutaneous tissue and lead to the production of bone.

Iochhammer (1912) studied the regeneration of bone by the heterotopic transplantation of scrapings from the cambium layer of the periosteum and obtained negative results. But on repeating the experiments with teased

pieces of periosteum he observed bone regeneration in 15 per cent of the eight cases. However when a mixture of scrapings from the periosteum and outer surface of the bone was transplanted into muscle small nodules of bone were observed as early as the tenth to fourteenth day.

Berthiers (1894) in his studies on myositis ossificans transplanted periosteum into muscle with practically the same results.

Jokio (1912) observed bone formation in heterotopic transplantation of an emulsion of periosteum injected subcutaneously or in intramuscularly. He also stated that if fresh blood was injected there was no increase in bone formation but there was increased proliferation when fibrin was substituted for blood. Nakahara and Dilger reported in a previous publication very similar results.

Haas (1913) concluded that the periosteum especially in the presence of blood clot has the power to regenerate bone that the regeneration of bone was never found excepting when periosteum was present. In a more recent article (1914) he states that it is apparent from his studies that the periosteum is very actively concerned in the regeneration of bone. There is at first a proliferation of all its cellular elements to produce a cartilaginous material which is in turn changed into bone.

Schepelmann (1913) finds that the periosteum when transplanted into the omentum, mesentery, spleen and liver regenerated persistent new bone and he emphasizes the importance of vascularity, integrity of the cell and the use of the entire periosteum.

Ryerson (1913) attacking the problem by an entirely new method concludes from roentgenoscopic study of the early changes which take place in fractures that there is regeneration from the periosteum because he could not see any new bone formed in the osteoperiosteal angle where the periosteum is stripped up from the cortex.

Gallie and Robertson (1914) conclude from their experiments that periosteum is unable to regenerate bone. Their experiments consisted in separating the periosteum from the cortical bone by some metallic substance such as tinfoil and later examining for evidence of bone formation from the periosteum.

McWilliams (1914) states that the osteogenic properties of the periosteum are not of much importance but assigns a new function to the periosteum and thus its power to increase the blood supply. The periosteum renders the transplant more easily permeable by surrounding capillaries thus insuring the early establishment of an adequate circulation through it.

Groves (1914) concludes from his experimental studies in an extensive article that the periosteum has no osteogenic function.

Meyer and Wehner (1914) present in their studies on the regeneration and transplantation of bone conclusive evidence against the theory of Macewen and his followers. They observed that periosteum from a very young animal when transplanted into muscle possesses the property of regenerating bone also that periosteum after subperiosteal resection of the ribs possesses the property of regenerating bone. They also ascribe a like function of proliferation to the endosteum.

Nicholls writing on osteomyelitis says:

When periosteum retains its vitality it will regenerate new bone but if the periosteum slough there will be no regeneration. Success depends upon mechanics and physiology, osteoconductivity and osteogenesis. Bone alone is mechanically efficient but physiologically deficient; periosteum alone or with its attached osteoblasts is physiologically efficient and mechanically deficient.

After a careful perusal of the voluminous literature and a review of the method of experimentation the question arises as to what constitutes the periosteum and have all investigators included or excluded the same components? Are the constituent components of the periosteum constant or are they subject to extensive variation either numerically or in type and arrangement of cellular element. Because of the utter confusion which has arisen concerning the exact component of the periosteum a detailed description of its origin, development and anatomy, both gross and histological, is demanded.

DEVELOPMENT OF THE PERIOSTEUM

During the early development of the fetus many of the cells of the somatic and splanchnic mesoderm are transformed into what is known as the mesenchyme. The

mesenchyme is the forerunner of connective tissue. These tissues are intimately associated with the formation of all the organs of the body and also become definite membranes, cords or solid masses etc. such as fasciae, tendons, ligaments and cartilage. From these primary connective tissues bone also develops. It may develop in either of two methods, i.e. either direct from fibrous tissue in which case it is known as intramembranous bone or it may develop from cartilage as an intermediate stage and then is known as intracartilaginous or endochondral bone. In either case it is developed from mesenchyme but differs from other mesenchymatous derivatives in that bone is never of primary formation always developing either in preformed fibrous tissue or cartilage. In intramembranous development when the inherent organic power of the organism stimulates the fibrous tissue to become differentiated into osseous tissue, certain cells known as osteoblasts deposit calcium salts in the fibrous tissue matrix forming a network of bony spicules. These spicules as development continues increase in thickness and extend farther out radiating in all directions into the connective tissue matrix. Sometime later the cells of the mesenchyme which are directly adjacent to the reticular plate of bone previously produced are seen to condense and form a stout membrane. This membrane becomes what is known as the periosteum. By the time the periosteum becomes recognizable as a distinctly condensed membrane, a layer of osteoblasts arranges themselves in a more or less definite manner between the periosteum and the developing bone. Here limited externally by a fibrous tissue membrane the osteoblasts deposit a lamella of compact bone.

Endochondral bone development. This mode of development differs in many respects from intramembranous bone development. The preformed bone fundamental exists in hyaline cartilage. This cartilage is surrounded by a fibrocellular membrane, the perichondrium. Ossification in cartilage is initiated in one or several circumscribed areas known as ossification centers. While certain changes are taking place in the cellular elements of the

cartilage there is deposited a thin layer of bone by the perichondrium in precisely the same manner as takes place in intramembranous development of bone. The perichondrium becomes the periosteum and is directly derived from the mesenchyme.

ANATOMY OF THE PERIOSTEUM

The periosteum is a dense fibrous tissue membrane completely surrounding and adhering to the surface of the bone except at the extremities where the bone is covered by cartilage. At the situation of the tendon attachments the periosteum becomes a part of the structure. Many blood vessels traverse the periosteum and enter the compact bone through Volkmann's canals. When it is stripped from living bone many bleeding points are seen which mark the site of entrance of these vessels into the bone. Trabeculae of fibrous tissue pass from the periosteum into the bone piercing it at right angles to its surface causing the membrane to be firmly adherent. These fibers are the fibers of Sharpey. They do not penetrate deeper than the circumferential and intermediate lamellae—bone formed by the periosteum. Blood vessels from the periosteum penetrate the compact bone and reach the marrow substance communicating with branches from the nutrient artery. The periosteum also furnishes the blood supply to the cancellous bone the branches of which ramify in the cavities of the spongy bone.

HISTOLOGY OF THE PERIOSTEUM

The following description of the periosteum which taken entirely from my own studies does not differ from that found in standard textbooks by embryologists anatomists and histologists among whom there is a general consensus of opinion that the periosteum *per se* has specific osteogenetic properties.

The histological structure of the periosteum differs in its component constituents at different stages of development of the body. During the stage of developing and growing bone the periosteum contains an active third layer or a periosseous layer in which is found fine connective-tissue fibrils numerous small

blood vessels and rows of small cells, the osteoblasts. In adult bone or after the growth of the bone has ceased this periosseous layer diminishes to a few remnants of its former structure and contains few small blood vessels and only an occasional osteoblast. The histological structure of the periosseous layer is intimately associated with the function of the periosteum its component cellular elements increase or decrease numerically directly with the physiological or pathological variation of its function. In adult bone its function is slightly different from that of young bone and extremely at variance with that of irritated bone.

In studying the histological elements of the periosteum it is not sufficient to examine the stripped membrane but it must be studied in its proper relation to compact bone. If this is the method pursued the difficulty immediately arises as to exactly where to draw the line of separation between periosteum and its underlying structures. This difficulty can be readily demonstrated if the histological elements of the periosteum in the center of a long bone such as the tibia are studied intact then strip a piece of the periosteum from the same tibia with a quick stroke of the periosteotome and likewise a similar strip from the same tibia but with a slow raising motion of the periosteotome and examine each strip microscopically. The variation in the line of separation can easily be demonstrated. This variation becomes more marked when bones at different stages of development are studied.

The periosteum is a membranous coat of fibrous tissue. It consists of an outer layer made up of interlacing bundles of dense fibrous tissue and large blood vessels the branches of which penetrate into the underlying compact bone. Directly beneath this and in contact with this outermost layer is a firm fibro-elastic stratum which varies with the age of the bone. In adult bone it is closely attached and firmly adherent to the surface of the bone. Beneath this latter stratum there is a periosseous layer of tissue consisting of small vessels numerous small cells and fine connective tissue fibrils—the subperiosteal areolar tissue of Macewen. The cellular elements are profuse in young or developing

bone and are easily divided into two distinct types—an outer layer of cells with plate-like nuclei closely packed together and an inner layer containing small oval nuclei. These two types of cells are probably dormant osteoblasts (Haas). Haas describes a layer of spindle-shaped and pycnotic nuclei immediately on the outer surface of the cortex.

Microscopically there is no demonstrable line of separation between the periosteum and compact bone. Occasionally there is an artificially produced line of separation during the sectioning process but this varies.

The histological components of the stripped periosteum varies with the method of stripping, definitely proving that there is no distinct line of cleavage. One specimen stripped slowly contained cellular elements not present in a specimen stripped quickly or with a sharp periosteotome.

Many conflicting and variable results are published by many different observers all practically working under conditions which appear to be identical but more careful study of these conditions reveals an extreme variation. When an able observer states that the periosteum has been transplanted the question immediately arises: Is this structure as used by experimenters a constant definite structure? The term periosteum as used is generally understood to be the periosteum from a surgical standpoint. As such it is considered as that membrane which remains after a careful subperiosteal resection of the underlying bone, especial care being exercised that no bone elements are left behind. Moreover it is definitely known that the periosteum in different stages of bone development contains specific cellular elements in varying numerical proportion. These cellular elements are also increased by either toxic chemical or mechanical causes. Therefore it would be expected that in experiments produced with such a varying structure as periosteum although all other details were identically carried out the results would be at a greater or less variance with each other even so far as absolutely contradictory results.

The following conclusions are drawn from considerable experimentation carried on at several different institutions some under very

adverse conditions and others under favorable circumstances. The experiments will not be enumerated as in many cases they are repetitions of previously published works with only one exception. The variability of the periosteum in its surgical sense was constantly kept in mind. In one set of experiments several associates removed the periosteum for transplantation from different animals of the same species standard adult rabbits of the same age being selected. All the transplants thus secured were transplanted by one experimenter using the same identical technique and yet the results obtained were absolutely contradictory to each other. This clearly demonstrates that the cellular elements of the stripped periosteum are dependent upon a varying personal factor. Without going any farther into the details of the experimental procedures it is possible at the present time to vary the end results according to certain technique, i.e. periosteum stripped quickly and with a sharp periosteotome will produce bone in a greater percentage of cases if young animals are used than if fully developed adult animals are employed. Likewise a greater percentage of positive results will be obtained with periosteum which is stripped slowly and with an elevating action of the periosteotome than when the periosteum is quickly torn loose from the compact bone. A very large percentage of positive results can be obtained by using very young animals and small strips of periosteum. Fibrin is a very active stimulant to osteoblastic activity.

In the clinical utilization of these facts many important factors must be taken into consideration with respect to the end results desired, i.e. stage of bone development care with which the subperiosteal resection is performed, ample allowance should be made for satisfactory conditions suitable to fibrin formation and a generous supply of blood to the part provided for.

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was found unconscious temperature 94½ pulse 120 and respiration 40 Breathing was entirely thoracic Very slight palpation in the region of the epigastrium quickly aroused the patient causing unbearable pain It was very clear that a perforation of the duodenum stomach or gall ducts had occurred No history of previous illness or attacks could be obtained from the patient Questions were answered incoherently and unwillingly Considering that there was no blood in vomiting but only a greenish acid liquid and on the statement of a relative who assured me that the patient had never had any gastric disorders and taking into consideration the comatose state of the patient which I always regard in upper abdominal calamities as characteristic of common duct trauma I was led to diagnose the case as one of common duct perforation not without making mental reservations as to possible errors ½ hypodermic of morphine ¾ gr and atropine 1 / 30 gr was given Immediate operation was advised which was promptly refused Four hours following this visit after the family had secretly consulted with a number of doctors for a cure the patient was seen in consultation with Dr G B Jackson and found in the same condition as earlier in the morning with the exception of a slower pulse due to the action of the morphine At this time the patient was taken to the Protestant Deaconess Hospital At the time of beginning anesthesia the temperature had gone down to 93 and the patient's condition was considered very critical

Bearing in mind the diagnosis made in the morning the abdomen was opened by a Spanghel Kocher incision. Some bile and bloody serum escaped from the wound. The gall bladder was not ruptured. The border of the liver was quickly brought out of the wound and raised. The gastrohepatic ligament was divided exposing the lesser

peritoneal cavity which contained considerable bile and bloody serum. This was quickly and completely wiped off and the common duct examined. A perforation about 7 or 8 mm in length was found below the juncture of the common duct and the calculus was protruding from the rent. This was extracted with several other small stones. The ducts were explored for the presence of other calculi and the rent was closed with very fine chromic gut by Czerny Lambert sutures. A cholecystotomy was rapidly performed to secure drainage and as an expectant measure for the probable development of a common duct stricture in order to afford immediate protection to the dying patient against a biliary obstruction. A cigarette drain with a rubber tube in its center was placed at the perforation. The patient's condition was somewhat improved at the end of the operation. Seven hundred ccm saline solution with 15 m adrenalin was given intravenously and the patient returned to bed.

The recovery was uneventful the patient being dismissed from the hospital completely cured after three weeks. The cholecystostomy fistula closed entirely in four weeks from date of operation. On December 1914 patient was visited to ascertain her condition and was found in perfect health.

The point I wish to emphasize with the report of this case is that a correct diagnosis was made from the peculiar coma the patient exhibited. In a large series of operations for acute upper abdominal calamities especially perforations of the gall bladder stomach and duodenum I have never observed the comatose condition but have invariably noticed it in perforations of the common duct.

ETHIOIL COLONIC ANALGESIA

A REPORT OF THIRTY SIX HEAD AND NECK OPERATIONS WITH SPECIAL REFERENCE TO
TEN THYROIDECTOMIES.

By JOSEPH L. LUMBARD, M.D., N.E.M.F.

Instructor in Anesthesia, University of Illinois Hospital Medical College, Anesthetist, Illinois, Herbucker, J. Lyng in H. total.

ABOUT one year ago Dr James T. Cawthney worked out a practical method of administering ether oil per rectum for general anaesthesia. I wish to draw attention to a class of cases specially commended for this method, namely head and neck operation. My technique differs from Cawthney's in three respects.

- 1 I do not use oil for a cathartic before giving the anaesthetic.
2 I use no preliminary bowel medication.
3 The ether and oil are thoroughly mixed by shaking them in a bottle for one minute. Otherwise my technique is the same as (with) me, and I think we are indebted to him for developing this valuable method.

Sex	Age	Weight	Nature of Operation	Surgeon	Length of Operation	Amount of Ether and Oil Used	Other Anesthetics Needed	Range of Pulse During Operation	Range of Respiration	Time of Recovery	Post-Anesthetic Condition	Remarks
M	6		Upper superior maxillary	D. J. C. Connelley	hours and 20 minutes	40 cc ether	large mass capsule and ether for minutes	60 to 5	8 to 3	Reacted on table	nausea	Atrophic delayed action of anesthetic; very uncomfortable operating table on which anesthetic was administered and cause of strangles
M	8	60	Erythema of ear	Dr. W. H. Luckert	30 minutes	10 cc ether 30 cc oil	10 cc ether 30 cc oil	70	8	At rest of operation	nausea	Alcohol on bag old as a prepared primary anesthetic
M	5	40	Cleft palate	D. J. C. Connelley	30 minutes	ether	Very little ether used	70	75	hours	nausea	
F	7	10	Excision of (ear)	Dr. P. C. Connelley	hours	ether	None	50	8	10 hours	nausea	
M	16	50	Sacrospinous ligament	Dr. J. C. Connelley	hours	10 cc ether 5 cc oil	Ether for minutes	75	90	5 hours	nausea	

TECHNIQUE

Have the bowel moderately cleared by compound liquorice powder a few hours before operation. Irrigate the bowel with plain water until the return is clear. This should be done two hours before operation. Do not use soapsuds to cleanse the bowel before giving the anæsthetic mixture as the soap will form an emulsion and retard the action of the anæsthetic. Part of the cleansing enemata is sometimes retained for hours after the bowel appears to be empty. To make sure that the bowel is empty I advise the introduction of a large rectal tube and have the patient assume the quating position. This with a little massage of the abdomen will effect the purpose.

A hypodermic of morphine and atropine should be given one half hour before the anæsthetic solution is administered. The patient should remain in bed in a quiet darkened room until the anæsthetic has been administered and he is ready for the operating room. Thirty minutes after the morphine and atropine the patient should be placed upon the left side with knees well drawn up. Introduce a small well oiled soft rubber catheter with a funnel attached into the rectum for about three inches.

The patient is now ready for the anæsthetic mixture which usually is composed of three parts of ether and one part of olive oil (by measure). One should never use more than eight ounces of the mixture usually allowing one fluid ounce to every twenty pounds of the body weight. Age weight fever anaemia and general weakness modify the dosage as in other methods of general anæsthesia.

After measuring the ether and oil they should be poured into a bottle corked and well shaken for one minute. This thorough mixing is very important. Allow the ether and oil mixture to enter the rectum very slowly having the nurse pinch the catheter so that it takes about five minutes. The catheter is now slowly withdrawn and pressure made over the anus with a hard rolled bandage to prevent any expulsion of the anæsthetic. Ether is usually detected on the patient's breath in from three to five minutes and usually the patient will show

evidences of being anesthetized in proportion to the early detection of ether on the breath. Signs of sleep followed by signs of anesthesia usually take place in from five to twenty minutes. When surgical anesthesia is present the pressure over the rectum should be removed and the patient placed on a stretcher and taken to the operating room.

Delayed anesthesia Should anesthesia be delayed over fifteen minutes place a wet towel over the face. Then if necessary give a few whiffs of nitrous oxide or ether by the closed method. Oftentimes a closed inhaler placed tightly over the face will deepen the anesthesia. One bag of nitrous oxide will often lengthen surgical anesthesia for one-half hour.

Overdose Should sudden or deep anesthesia occur the rectum should be immediately emptied (see Case 9) with a large rectal tube having perforations at the sides and one at the end. To do this incline the operating table with the head up at the same time massaging the abdomen and establishing a free airway with Lumbard's controller of the tongue and palate. Should respiration cease use artificial respiration and give gas bag of equal parts of carbon dioxide and oxygen.

The rectum should be emptied during the last part of the operation. As soon as the patient has been returned to bed irrigate the bowel with tepid water until the return does not show any ether-oil and introduce three ounces of olive oil to be retained.

OBJECTIONS TO METHOD

The only logical objections to this method are the introduction of the whole amount of the anesthetic at once and the apparent loss of control. However by following this technique and devoting special care to the age, weight and general condition of patient I find the above objections are removed.

DISADVANTAGES

- 1 The technique requires more time before and after the operation.
- 2 The prolonged sleep after the operation while a distinct advantage to the patient may increase the anxiety of the relatives. The anesthesia blend so imperceptibly with a

normal sleeping state that it is hard to tell where one ends and the other begins.

- 3 It should not be used in diseased conditions of the bowel or for rectal operations.

ADVANTAGES

- 1 In head and neck operations where the anesthetist is in the way.

2 Patients can be anesthetized without their knowledge. This is of great advantage in operations for exophthalmic goiter and in operations on nervous and insane patients.

- 3 It removes the dread of the usual inhalation methods.

4 There is no excessive mucous secretion about the air passages. This is of great advantage in bronchoscopy.

- 5 The respiration and pulse are more normal than in any other method of general anesthesia.

6 It does away with the mask or inhaler.

- 7 There is less hemorrhage in head operations.

8 There is less tax on the heart, lungs and kidneys.

- 9 The apparatus is simple, cheap and can be carried in the vest pocket.

10 There is less nausea and vomiting than with other methods of general anesthesia.

- 11 There is no postanesthetic excitement.

SUMMARY OF CASES

The average pulse rate in the 36 cases including 10 thyroidectomies was 87 per minute; the average respiration 21 $\frac{1}{2}$; no nausea or vomiting in 28 (80 per cent).

Cases 2 and 6 had been previously anesthetized by the usual inhalation methods and both emphatically prefer the rectal method.

To anesthetize an aggravated case of exophthalmic goiter without the patient's knowledge maintain surgical anesthesia with a normal pulse and respiration and keep the upper air passages free from mucous secretions is one of the most difficult tasks confronting the anesthetist. This can be done by this method. Having had 90 cases (with 18 different surgeons) I feel justified in recommending the extended use of this method in head and neck operations. Have never known of any rectal irritation due to this method.

PRELIMINARY REPORT ON THE USE OF THE PERCY CAUTERY IN CARCINOMA UTERI WITH ESPECIAL REFERENCE TO ITS USE AS A FORERUNNER TO THE WERTHEIM OPERATION¹

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WHEN Byrne of Brooklyn, in 1892 published his epoch making paper on the actual cautery in cervical carcinoma he produced a profound impression upon the surgical world. Since the appearance of his article many have tried to emulate the brilliant success he achieved but none has been able even to approach his results. This I believe was primarily due to the fact there was no concerted plan of action each operator having worked on independent and different lines of thought. There was no one recognized technical plan to follow the scientific conception and purpose was hazy and cauterization accompanied with curetting was done in a desultory and indifferent manner all of which terminated in disappointing results.

Such was my unsettled state when Percy of Galesburg Illinois gave to the profession in 1912 a clearly worked out scheme by which heat could be applied on a far more elaborate basis than ever before. He worked out a superb technical plan. His method of protecting the vaginal canal with the water-cooled speculum of controlling the degree of diffused heat by a hand within the abdominal cavity as well as his electric cautery with its wonderful possibilities were at once attractive.

He further ably presented the underlying basic principle which after all is the crux of the treatment wherein the hot iron disseminates the heat wide of the site of the disease thus raising the temperature of the surrounding tissues to a point at which cancer cells are destroyed and normal cells unaffected. Experimentation shows that cancer-cells are peculiarly susceptible to heat and are killed if raised to a temperature of 113 whereas normal cells are not changed until the temperature exceeds 131 to 140 (Percy).

When we first employed this method it was primarily in the inoperable or surgically abandoned cases, and we used as did Percy the soldering irons. The temporary results in these cases were at once striking. The hemorrhage would cease and with the detachment of the slough went the stench. As the source of toxæmia was eliminated the appetite improved pain greatly diminished and from a desiccated cadaverous-looking individual many of these cases were so notably transformed that it was depressing to realize that these women were only temporarily restored. Beyond a doubt these cases are given a comfortable extension of life. A certain percentage of these cases of the advanced type were converted into the operable as evidenced in two cases who when first seen dispelled all thought of operability but after a series of applications of heat the uterus became movable there was no appreciable lateral infiltration and as an operative risk they were transformed to such a degree that Wertheim's removal was performed and much to our surprise after repeated serial sections and most careful search no cancer-cells could be found in either specimen.

There are now two cases in my hospital service one of whom has had five hot-iron applications with one abdominal opening and the other three treatments with two abdominal openings. They have constitutionally and locally marvelously improved and though they were considered beyond all surgical hope if this progressive improvement continues it is believed that a radical operation may be done.

Pathologists have long since taught us that one cannot foretell by the macroscopical appearance of a cervical cancer just to what extent it has metastasized. Therefore with Percy's method I am giving practically every

case a chance Bonney of London was telling me this past summer that the pathologist of the Cancer Hospital of London had performed autopsies on one hundred cases dying of cancer of the uterus and found that in 46 per cent of these cases the lymphatics were not involved beyond the pelvis and from a viewpoint of lymphatic invasion the cases were curable from an operative standpoint. This is a startling observation and even though we accept it as only partially true it gives a reasonable basis for a cure in some advanced cases and further accounts for the sporadic cures nearly every man has had in the use of the old zinc chloride paste.

In the border line operative cases the application of this extensive heat has a most gratifying result making many operable that otherwise would have been declined. When ever there is a definite ulceration with bleeding having as a rule an associated local infection with slight infiltration the Percy cautery should be employed as a preliminary measure since it not only acts in destroying the infection but stops bleeding and toxemia and the case will in three weeks be a far better surgical risk than when first seen. To apply the heat properly it takes fully thirty minutes in the simpler cases and sometimes as high as fifty minutes in the advanced ones. Therefore it is not well to add to this an additional hour and a half to two hours manipulation in performing the radical but it is better to divide the procedure into two sittings. The method occupies an unique position in converting the inoperable cases into safely operable ones.

Whereas the heating iron is a valuable adjunct in the effort to destroy cancer process I have always felt that the radical removal along the lines devised by Clark, Reis, Werder and Wertheim enabled one to get wider of the involved area than the heat possibly could radiate and I therefore believe that in the judicious combination of the two plans a greater percentage of permanent cures will be realized.

In the earliest type of cervical carcinoma where the patient is a good risk it seems to me that we should use the heat as a preliminary step. First the abdomen should be

opened and the cautery should be introduced within the cervix. The hand should be inserted within the abdomen to ascertain when the heat reaches the point where it can barely be tolerated. If heat to such a temperature is maintained for ten to twenty minutes all cancer cells so influenced will perish and then when the abdomen is invaded immediately after there is no danger of grafting cancer cells at any rate those cancer-cells near the uterus and within the vault of the vagina. This is the plan I have more recently adopted and since this extra twenty minutes does not overtax a good risk the radical operation immediately follows the cauterization. Every effort is being made to follow these cases closely and later I hope to report the end results feeling that some instruction will accrue from comparison in cases so treated with those not heated.

This report is purely a preliminary one since the work is not two years old the bulk of this material has been treated in the past year and to discuss such premature results would be folly. However even though the work is in its infancy since our results at the present time have been so encouraging and further since it is possible that we may offer some new idea as to the further scope of the method it is presented trusting that others may be stimulated along similar lines.

As others work along the Percy plan the originator will naturally be encouraged and certain refinements of the method will follow. It was with this viewpoint that my clinic took up this investigation.

We have had in all only twenty five cases but have done more in the past seven months than in the preceding one and a half years. From these few cases we have in point of technique closely followed Percy's teachings. In the first cases the copper irons were used they being plunged into the mass from which would roll huge clouds of smoke. This was before we appreciated that the real idea was to heat and not to carbonize thus causing the operating room to be filled with fumes of charred flesh. The electric heating iron replaced the copper and with it came the greatest joy. This electrically heated iron is perfect it can be kept at a constant low or

high heat and one is freed of the worry of constantly changing irons. If nothing else comes of this elaborated heat method this electric cautery will in itself stand for all times. We never curette but use heat throughout. The low grade simmering heat free from charring and smoke leaving behind a sickly yellow color to the immediately surrounding tissues is that which is to be desired. Carbonizing the parts is to be avoided since carbon is a bad conductor of heat and the essential point desired is a wide distribution of heat as far out from the involved field as possible. In the extensive proliferating external type of carcinoma it is best to use the cutting blade of the cautery as a knife for amputation for to destroy completely the external growth so as to get within the uterus would take an interminable time. Another point in Percy's plan from which we vary is in not routinely opening the abdomen at every heat sitting. In a case having a large fungating sloughing mass this is first destroyed without section then after the original growth has shriveled and the general condition improved in about three weeks later at the second sitting the abdomen is opened and the heat applied high up within the uterus using the hand as a guide to the location of the cautery as well as to the degree of heat.

Two hemorrhages occurred in my cases one of which ended fatally. This was in a very advanced and hopeless case from the viewpoint of cure. The nurse saw her at 1 a.m. when she was well but at 5 a.m. she was found dead having had a profuse hemorrhage. The other case was easily controlled by packing. I have been contemplating the ligation of both uterine arteries and one ovarian as a prophylactic against hemorrhage and secondly expect to see as a result of the diminished blood supply a retarding influence follow the starvation. This in certain cases should be easily done by incising the peritoneum on the posterior surface of the broad ligaments just above each ureter and then running the finger down along its course to the artery in front when with an aneurysm

needle both uterine arteries could be ligated at a distance from the ureters. As a result of the liberal anastomosis it seems that one ovarian would be sufficient to maintain nutrition.

Two vesicovaginal fistulas followed the use of the method. In one of these cases, when I went in from above to cure the fistula which was high up a radical removal was done and this is one of the uteri in which I was unable to find any cancer cell. The other fistula case was so involved with cancer that it was impossible to restore and though temporarily improved constitutionally is now hopeless and will live only a few more months.

Only in the past week I heated a perfectly operable cervical carcinoma in a heavy short-necked chubby obese woman in which it was out of the question to attempt a radical but in which it was perfectly safe to make an incision to introduce the hand as a guide to the hot iron. In this type of case this method offers hope and is the only one that could be safely employed.

In point of specula we have devised some slight modification of Percy's originals. In large fungating growths it is impossible to bring the mass in the field so I found that in dividing the cylindrical speculum converting it into two parts each having a handle that this obstacle was overcome. Another speculum we have is one a little longer than the original and beside being slightly conical differs further in having a small projection on its posterior margin which keeps the vaginal wall from rolling around its end thus eliminating the annoyance and dread of burning the bulging rectovaginal wall.

Finally as yet no true end result can be deduced from my cases but from the temporary results so far obtained we feel encouraged and believe that in Percy's elaborate heat method a definite advance has been made in the treatment of cervical carcinoma and not only is it a most valuable agent in managing advanced carcinoma but when combined with the extensive removal of the uterus our percentage of permanent cures will be as we hope to show in a subsequent report definitely improved.

ON THE OCCURRENCE OF A NINE-MILLIMETER HUMAN EMBRYO IN THE MARGIN OF A FULL-TERM PLACENTA¹By ROY I. MOODIE, PH.D. CHICAGO
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INTRODUCTION

Many occurrences such as the one suggested by the title of this paper are described in medical literature usually under the heading of superfetation. However superfetation today is not widely accepted and still remains unexplained. It is my intention in this paper to discuss briefly all the possibilities of the present case without any attempt at settling the question as to which the conditions described in this paper represent. It is thought that an impartial account will be of greater value than to assume that the occurrence represents any one possibility.

The finding of the small embryo in the margin of the placenta of a full term child was quite accidental and it is possible that an examination of a large series of placentas may reveal other occurrences of a similar nature and thus help in the solution of a difficult problem. The anatomy of the embryo and its position in the deciduous membranes all point to an unusual state of affairs.

The case described below is so unique and the clinical history so complete that the writer ventures to add yet another paper to the long list of contributions issued during the last 500 years on a subject which is yet unsettled. The question at issue is whether superfetation may occur in a pregnant uterus after the fourth or fifth month of pregnancy.

The various means suggested for the explanation of this case are given in the following outline and each subject is discussed below with references to the literature.

- I History of the case
- II The placenta and the finding of the embryo
- III Anatomy of the embryo
- IV The embedding of the ovum
- V Parthenogenesis
- VI Fertilized polar body

VII Twins—small one due to inanition

VIII An embryoma?

IX Superfetation—Historical discussion with review of literature

X Summary

I HISTORY OF THE CASE

It has been possible to secure all clinical data necessary for describing the case. The mother of the child herself furnished most of the data herewith given with the express purpose of being included in this account.

The patient, age 3, primipara, a large healthy woman, was admitted to the Texas Baptist Memorial Sanitarium of Dallas, Texas, January 18, 1914, at 6 p.m. She has no special complications in labor because of edema of the feet and legs. Urinalysis showed albumin present, no casts. Temperature 99, pulse 82, respiration 26. Labor began first stage 10 a.m. January 20, 1914, membranes ruptured 4.4 a.m. January 1, 1914. The child was born on January 21 in normal spontaneous delivery at 0.40 a.m. with an unusually large amount of liquor amni. The placenta was delivered spontaneously at 0.50 a.m. and was sent to the anatomical laboratory before noon. The child female was apparently normal in every respect, weight 9 pound 3 ounces with an abundant growth of very dark hair. The baby gained rapidly and at the end of the first week showed an increase of 3 1/2 ounces in weight (9 pounds 7 ounces).

The last menstrual period of the patient was April 19, 1913, and no discharge since that time up to the time of delivery save an unsustained leucorrheal discharge. About three weeks after patient counts her pregnancy began by morning nausea was experienced but no vomiting ever save on the morning of delivery. Urination during pregnancy copious. Patient's health has been better during pregnancy than during any other period of her life. During the first week of December, 1913, patient developed back and pains stopped housework and went to bed for the greater part of the time though not so faintly. The patient considered this condition due to a bad spell of diarrhea which began after the lagging and continued for 24 hours. No headaches during pregnancy. Breasts began aching about the third month of pregnancy and ached up to the sixth or seventh month. Coitus was indulged in up to within about three months of the birth of the child.

Patient before marriage had been operated on by the same physician who attended her in labor. At that time May 16 1910, appendectomy curettage resection of the left fallopian tube removal of left ovary and removal of cyst from right ovary were performed. The attending physician informs me that neither at the curettage nor during parturition were there any indications of a bicornate or bipartite uterus and if present it would probably have been indicated in curettage though not necessarily so.

II THE PLACENTA AND THE FINDING OF THE EMBRYO

The placenta was received in the laboratory a few hours after delivery and was examined while fresh. During the course of class work in embryology we were looking for the yolk sac which is stated to occur commonly near Schultze's fold (12 Fig 202 18 p 173 8 Fig 67). A small yellowish body was noted on the extreme margin of the placenta opposite the well developed amnion fold of Schultze which on examination was found to be embedded under the amniotic and on the chorionic membranes directly adjacent to one of the large marginal cotyledons (45x46 mm) or in other words it occupied the exact site of the yolk sac. The object was carefully removed and on examination under a binocular attention was immediately called to the possibility of its being embryonic in origin by the slightly pigmented optic vesicles as shown in Figs 1 and 2. It was immediately fixed in formalin carefully studied measured and sectioned. The results are shown below.

The placenta is quite normal in appearance and compares very favorably with that figured by Grosser (12 Fig 195) and DeLee (8 Fig 60) so much so that reference may be made to these figures for an idea of the appearance of the present placenta. It is slightly oval measuring 21 cm x 19 cm which according to Grosser is approximately the normal size of the placenta. Durchschnittlich hat sie (placenta) etwa 16 bis 20 cm Durchmesser doch kann dieser noch normalerweise 13 oder 25 cm betragen (Grosser 12 p 260).

The cord is attached acentrally being 8 cm from the nearest margin. The fold which has been identified as that of Schultze's is

well developed and was attached rather high up on the side of the umbilical cord.² The yolk-sac was not found although it is figured in this place by Grosser (12 Fig 202 Nb) and is stated by him to occur commonly in this place. 'Der Dottersack oder das Nabelblaschen Vesicula umbilicalis ist ein konstanter Bestandteil der reifen Nachgeburt der sich aber durch seine Kleinheit und sein unscheinbares Aussehen der Beobachtung leicht entzieht. Er liegt zwischen Chorion und Amnion aber ohne dass sich eine bestimmte Gesetzmässigkeit für seine Lokalisation aufstellen liesse' (12 p 276).

It was directly opposite the fold of Schultze that the small embryo was found embedded between the chorionic and amniotic membranes enclosed in a sac to the walls of which it was slightly adherent (Figs 3 and 4). The embryo lay immediately adjacent to the large cotyledon represented in Figs 3 and 4 (C). These figures show the opening from which the embryo was taken. It will be noted that it was embedded on the extreme margin of the placenta corresponding to the point in Grosser's Fig 202 where the membranes begin to wrinkle immediately above the legend.

The umbilical cord measures 57 cm in length which is the average length the distal diameter being 12 mm. In appearance it was perfectly normal. Grosser (12 p 271) gives the measurements of the umbilical cord as having a length of about 50 cm and a thickness of 1½ cm. Minot (24 p 360) after commenting on the variability of the cord says, 'It is usually about 55 cm long and 12 mm thick.'

It was not possible to determine the point of attachment of the placenta to the uterus (Grosser 12 Figs 180 and 181) although inquiries were made as to this point in the hope that previous palpations might have determined something. It is quite important that this be known but it is of course not possible.

Many other placenta have been examined in the hopes of securing another such embryo as the one herewith described but the case

Das Zeitbild zur Abbildung des Nabelbläschens stellt des Schultze'sche Amnionfalte dar. (12 p 180)

seems to be so far as I can learn unique although the occurrence reported by Schultze (1866) approaches this condition

III ANATOMY OF THE EMBRYO

The embryo which is slightly flattened laterally lay loosely in a sac to the membranes of which it was slightly adherent. The external features may be readily seen in Figs 1 and 2 for which I am indebted to Professor Hardesty of Tulane University as well as for assistance in sectioning the embryo. A careful study of the external features recalls the stage *Ma3* of Hochstetter.¹ Although it is not so mature it corresponds more closely perhaps to the embryo figured herewith. It is to be noticed however that while they correspond in measurement and general degree of development there are important differences. For instance in the present embryo the gill arches the mandibular cleft the limb buds the somites the eye heart and other features are not so strongly developed and seem to point toward arrested development. Doctor Hardesty suggested this possibility from an examination of a few of the sections on account of the presence of a large amount of infiltrated undifferentiated cells in the cavities of the neural tube heart etc. I had independently arrived at a similar conclusion from a study of the series of sections. The limb buds *b* were pressed into the side of the body of the embryo making a sharply defined crescent shaped depression. The anterior end of the neural tube is well differentiated at least externally as may be seen by reference to Figs 1 and 2 where the external contours of the primary encephalic vesicles are rather sharply marked.

The neural tube on cross section shows little definite structure being so infiltrated with undifferentiated cells Figs 6 7 8 9. It is slightly flattened in all the sections.

The notochord though very small is present throughout the body sections. The gill clefts which are in reality furrows, are indicated in the sections as slight ectodermal thickenings. I am unable to find any indication of what I feel sure are intestinal struc-



Fig. 1 Left lateral view of the nine millimeter human embryo. *a* 5 *b* Anterior limb bud *c* caudal filament *d* heart *e* undeveloped and undifferentiated yolk sac and belly stalk. Fig. 2 Right lateral view of the embryo. Legend as above. X 5.

tures. The feature marked *o* in Figs 1 and 2 is interpreted as undeveloped yolk-sac and belly stalk. The structure *c* Fig 1 is possibly the caudal filament.

The embryo looks as though it might have attained an age of four or five weeks but the conditions of arrested development noted above may and probably do indicate a greater age for the specimen. If we allow three months for the age of the embryo which may satisfy all the requirements of arrested development the case nevertheless clearly indicates that either the embryo was formed in the uterus when the first foetus was about 180 days old or else it was older than 3 months and represents a twin. If we take the last menstrual time in which conception may have occurred we have a duration of pregnancy of 270 days i.e. to January 21 1914 which is the average length of pregnancy the extremes being 220 and 330 days (DeLee).

It is interesting to note that the nuclei of the body tissues were all living at the time of fixation the red blood cells were unmodified and the tissues show no especial indication of the infiltration of leucocytes. It has been

suggested that this condition may be due to imbibition of fluids from the membranes in which it lay. This is assuming that the life of the embryo was extinct and that we have here a natural plasma culture. It will at least be interesting to consider this. Is this possible? If the embryo were dead how are we going to account for the presence of the red blood cell in the yolk sac and body stalk which were living at the time of fixation and which occupied a definite blood channel? The cavities of the blood vessels themselves are patent and there is no blocking of the blood channels such as would probably occur if the embryo were dead. That it is not a fetus papyraceous will be evident from the presence of these living tissues. Fetus papyraceous is usually defined as one of twin fetuses which has died and been pressed flat against the wall of the uterus etc. This embryo under consideration was not dead and it was not especially flattened as may be seen from an examination of the drawings of the cross sections (Figs 6 and 7). The condition of the blood cells in the blood channel in the yolk sac is shown in Fig 9 and the nuclei of the neural region in Fig 8. There are a few leucocytes in the region of the yolk sac but they do not appear to be of the army of invasion as would occur if the embryo were dead.

II. THE EMBEDDING OF THE OVUM

It is important to note that the embryo was found on the fetal surface of the placenta. Just how it reached this point is of course a matter of speculation. If we assume that the attachment of the uterus was in the normal position i.e. on the posterior wall (12 Figs 180 and 181) the ovum very readily may have embedded itself in the decidua instead of in the uterine mucosa. I do not know of a case in the literature of the embedding of an ovum in other than the mucous membrane of either the uterus, tube, ovary or peritoneum although Hufmann (1913) suggests such a possibility. Webster (30) in a study of ovarian pregnancy reached the conclusion that embedding areas were formed of müllerian tissue which may occur in detached portions at almost any place in the uterine region and that the implantation of an ovum

in other than müllerian tissue is improbable. Nidification in deciduous membranes is very uncertain but seems to have occurred in this case provided this is not a twin pregnancy. This position of the embryo may possibly account for the peculiar undeveloped external form of the embryo as well as for the absence of embryonic decidua. Lacking the nutrition which it would derive from the vascular supply of the uterine mucosa the embryo failed to develop normally and presents an appearance of arrested development.

The only membrane which could at all be called embryonic decidua was a very thin glistening membrane (possibly representing the amnion) rather tightly investing the embryo unattached either to the placenta of the full term child or to the embryo itself except for a few slight adhesions to the amniotic and chorionic membranes in which the ovum was embedded.

The presence of undegenerated red blood cell in the yolk sac would indicate that the embryo was living at the time of the birth of the child.

III. PARTHOGENESIS

That the small embryo found embedded in the margin of the full term placenta was due to parthenogenetic development may be suggested as a possible explanation.

This assumption would of course involve ovulation during pregnancy, nidification of the egg in decidua as well as parthenogenetic development, no one of which has been settled. Nidification in the decidua has already been referred to and ovulation during pregnancy will be discussed under the heading of superfetation. Parthenogenesis in vertebrates and especially in the human species in an unsettled condition. Bonnet (6) has reviewed all of the literature (161 titles) up to 1899 and concludes that parthenogenesis among the vertebrates is uncertain although it has been suggested for all groups of vertebrate except man. Bonnet (6 p. 860) says:

E besteht nach unserem gegenwärtigen Wissen keine Berechtigung bei Wirbeltieren mit Einschluss des Menschen von parthenogenetischen Vorgängen zu reden.

Leo Loeb (20) has described what he



Fig 3 A normal human embryo age 30 days length 4.4 to 5 mm introduced for comparison with the embryo which was found embedded in the margin of the placenta. Published by courtesy of Prof A C Eyleshymer

regards as a true case of parthenogenesis in the guinea pig. His conclusions are so widely known that it will suffice to say here that he regards chorioepitheliomata and teratoid tumors as derived from parthenogenetically developed ova.

In attempting to explain the present case by parthenogenesis it should be remembered from the clinical history that fertilization of a normal ovum by spermatozoa was possible in so far as the presence of the spermatozoa was concerned. As to how the spermatozoa reached the ovum we are not in a position to state but I am not ready to admit that such a union in a well filled uterus is utterly impossible.

VI FERTILIZED POLAR BODIES

It is not the purpose here to discuss the parthenogenetic development of the ovum through the retention of the first polar body but to cite an instance from the literature which will establish the possibility of the fertilization of a polar body by spermatozoa at the same or a later time than the formation



Fig 4 (above) Photograph of the margin of the placenta in which the embryo was embedded. The opening from which the embryo was removed. V placental vein. X Y outline of the underlying cotyledon against which the embryo rested.

Fig 5 Photograph of the edge of the placenta with the embryonic membranes reflected to show the marginal cotyledon C against which the embryo rested. A B limit of the marginal cotyledon C cotyledon D opening in the reflected membranes from which the embryo was taken. I point on the cotyledon against which the embryo rested. II reflected membranes. M maternal surface of the cotyledon.

of the first foetus. This involves the next possible explanation that of unequal twins.

Sobotta (28) regards the fertilization of the polar body in the mouse and other vertebrates as readily possible since this structure in the mouse is quite large but has not observed such an occurrence. I have not been able to find an actual case of the fertilization of the polar body in the literature.

VII TWINS—SMALL ONE DUE TO INANITION

It has been suggested that the baby was not normal but rather supernormal as indicated by (1) abundant growth of dark hair (2) slightly excessive weight and (3) it gained rapidly $3\frac{1}{2}$ ounces the first week. All of these point to the child being the dominant twin.

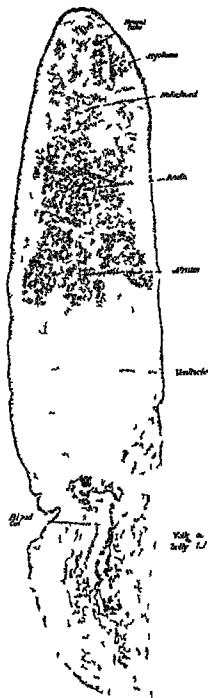


Fig. 6.

as though it had an extra supply of nourishment on which to draw. These may however be explained on the basis of the vigorous constitution of the mother.

The possibility of the existence of one of the twins unabsorbed for many months involves a high degree of retarded development due to an excessive amount of inanition. Jackson (17) has recently found in his work on the feeding of white rats that postnatal growth may be reduced 36 per cent by inanition. May we say that a higher degree of retarded development is possible during prenatal development? If the smaller twin (the embryo) was due to a fertilized polar body it may be that such a high degree of arrested development as is indicated by the embryo was possible. The embryo seems to have ceased all growth when it attained the four or five weeks stage of normal development. The possibility of the life of the embryonic cells being maintained by imbibition from the surrounding tissues has already been discussed.

VIII AN EMBRYOMA?

If as Loeb and others think embryomata are due to the development of parthenogenetic ova the present instance has already been discussed. Bonnet (6 p 861) Marchand and others however have assumed the origin of teratomata as due to misplaced blastomeres. Others have assumed a parasitic origin for these objects. Schultze, Martin and others have described a variety of teratomata but none so far as I am aware have assumed anything like a complete embryonic form.

IX SUPERFETATION HISTORICAL DISCUSSION WITH REVIEW OF LITERATURE

Superfetation may be regarded as a condition of the uterus wherein there are present two or more fetuses of different ages due to the fertilization of ova liberated at successive or different periods of ovulation. This condition is thus clearly distinguished from superfecundation where the ova concerned are

Fig. 6. Section through the body of the embryo. The region of the belly is enlarged (see the blood mass in the yolk filled with blood cells (as enlarged in Fig. 9) the infiltrated central part and the sharply defined nuclei which are shown on enlarged scale in Fig. 8.

liberated at a single ovulation and are fertilized by different or successive acts of coition.

The condition known as superfetation is difficult to distinguish from the formation of dichorionic twins in fact it is clearly evident that some dichorionic twins are due to the fertilization of ova liberated at successive periods of ovulation. The early fusion of the placenta may even cause them to appear as duplicate twins. Cases varying in age from a few days to several months are now known to have occupied a single normal uterus at one time and on this basis established our present conception of the obscure subject. Our present knowledge is however far from being free from objections, the chief desideratum being accurate clinical observations which will bring the subject above the surface of a mere probability.

Superfetation in a normal human uterus has been held by many to be impossible after the fourth month of pregnancy or after the apposition of the decidua reflexa and decidua vera (parietalis) between which there is no adhesion (Minot¹ 24 p. 20) except at the closing ring of Vitabuch Winkler (12 Figs. 170 and 18 N.E.). At the present day the actual occurrence of superfetation is regarded by many with suspicion. It involves ovulation during pregnancy and the embedding of an ovum in a cavity which is already well filled by a previously formed foetus.

Ovulation during pregnancy has been reported by Ravano (25) but the introduction of ova into a four or five month pregnant uterus is doubted by many. The passage of spermatozoa into a pregnant uterus is easily possible since there is no obstructing tissue or set of tissues which would bar their entrance excepting the mucous plug in the cervix (Minot 24). The possibility of superfetation is thus rendered probable and all that remains to establish the subject on a secure basis is accurate observation of the occurrence of such a condition.

Superfetation is among the oldest known medical subjects and is discussed in many of the writings of the ancients. It has been

¹Minot (p. 19) says that before the sixth month the decidua reflexa is absorbed.



Fig. 7. A section through the posterior portion of the embryo showing the condition of the tissues indicating greater amount of filtration of differentiated cells. The nuclei are still sharply defined and the blood channels are open.

impossible for the writer to find in the literature any mention of this subject among the Assyrians or Egyptians though it may easily have been known to them.

It was well known to the early Greeks and they may have derived a part of their knowledge from their predecessors as well



Fig. 8. The upper portion of Fig. 6 shows the largest of the vessels and the heavily stained nuclei of the cells of the chorionic region and the structure of the neural tube. It is evident that the nuclei are in the line of division. With this they are kept in by imbibition from the body fluids of the mother and child or whether itself was intrinsic to the myotome or notochord.



Fig. 9. An enlargement of the lower portion of Fig. 6 including the blood channel, the yolk sac. The figure shows the form of the erythrocytes and strands of fibrin. Leucocytes are rare there but two evident in the region shown. The hanging erythrocytes indicate probably slight pulsation of the vessel structures. It is possible however that the erythrocytes reached this level by diapedesis from the fetal maternal vessels. B = blood cells.

as from neighboring nations though knowledge in those days traveled slowly. Medicine has inherited from the writings of Hippocrates (470-361 B.C.) and his followers extensive record of sound observation and experience and to Hippocrates Gould (10) Bierbaum (4) and others refer a discussion.

On Superfoetation and this essay is included in many editions of the writings commonly attributed to him. Adams (1) however says that this dissertation is a spurious work and that it is not included in the more authentic editions of Hippocrates. Littré refers the treatise to Leophane. The essay is not included in the Greek edition (1679) of Hippocrates to which I have had access but it is included in many translations. Whether we owe the treatise to Hippocrates or not it is still certain that superfoetation was well known among the Greeks and it probably is of great antiquity. Gould (10) says that the Romans had law establishing the rights of women in cases of superfoetal births.

Aristotle (2) mentions superfoetation twice in his *History of Animals*. Pline the Elder (79-23 A.D.) refers to it in his *Natural History*. Since these early writers hundreds of references have been made to occurrences of superfoetation by medical men writing in nine different languages. The majority of

these latter papers are listed in the *Surgeon General's Index Catalogue*.

No attempt has been made to construct a complete bibliography since this would be useless repetition. Over two hundred titles are listed by the *Surgeon General's Index Catalogue* and it has been thought best to give here only those papers which are not readily found, those which give reviews of cases and those which have any considerable bibliographic matter.

A review of all the papers has not been possible since many of them are not readily available and the value of such a review is doubtful. Bierbaum (4), Bonnar (5), Schultz (26), Herzog (14) and others have reviewed the cases given in the literature sufficiently for our purpose. Many of the papers (about 100) listed in the *Surgeon-General's Index Catalogue* have been read and have been found for the most part to be hasty accounts of observations made generally by physicians in the course of their practice. Of the accuracy of observations of many of them there seems to be no doubt.

Superfoetation has been observed by King

(19) recently in the albino rat by Arrow smith (3) in the sheep and by others in the cat. Observations on superfetation in the human species have included every possible gradation from twins of different color or fetuses and child of different ages to a live fetus in the margin of whose placenta was embedded a nine millimeter embryo as observed and described by Schultze (26). Schultze (26) and Herzog (14) are the only writers so far read who have employed figures to illustrate their subject. Schultze figured very clearly in a lithographic plate (Tafel I) the placenta in the margin of which the embryo was embedded. This is a very close approach to the case cited in the body of this article.

In point of interest the paper by Schultze (26) stand out prominent. In his introductory paragraph he says: "Die Nachgeburt eine reifen oder der Reife n ihren Kindes im innigen Geweb zusammenhang mit einem Ei welches ohne alle Spuren von Fruchts einen wohlgeformten neun millimeter langen hoch ten sechswochentlichen Embryo enthalt—beim Anblick eine solchen Inapparates drangt wohl jedem sich die Frage auf Sollten nicht die Ausgangstermine der Entwicklung dieser beiden Eier mehrere Monate auseinanderliegen?"

After discussing several described cases of superfetation and pointing out the possibility of superfetation and superfecundation he adds: "Ich glaube da von all auf Superfektion verdachtig gewesen Fallen fur mein Präparat dieser Verdacht am meisten gerichtetigt war genaue Untersuchung konnte denselben beseitigen. Es liegt also die Frage der Superfektion genau noch so wie ich einige Seiten fruher ausgesprochen habe Ihre Moglichkeit kam a priori nicht in Abrede gestellt werden aber kein bisher beobachteter Fall bleibt vor strenger Kritik auf Superfektion erdachtigt." (Schultze 26 p 22)

SUMMARY

FIVE possibilities are suggested in explanation of the occurrence of the nine millimeter human embryo in the margin of a full term placenta: (1) Parthenogenetic development (2) a fertilized polar body (3) unequal twins

(4) an embryo or (5) superfetation. None of these five points are settled.

An examination of a large series of placentae may result in further discoveries of a similar nature.

Acknowledgments—The above paper was read before the Medical Research Club of the University of Illinois and before the Chicago Gynecological Society where it was very fully discussed. I have incorporated the results of the criticisms and suggestions advanced at these two meetings in the body of the paper and hereby acknowledge the assistance of the gentlemen in these societies. Acknowledgments are also due my colleagues in the University of Illinois and elsewhere for assistance in the preparation of this report.

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ON BENIGN BONE-CYSTS

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CASES of benign bone cyst have been reported from time to time since 1876 when Virchow described two cases that had been discovered by him at necropsy and subsequently studied. Since that time there appears in the literature some seventy-four cases, some of which considered in the light of recent study should hardly be classified as true benign cysts.

Unfortunately, however, these interesting lesions are sufficiently rare to have prevented any one individual seeing very many, and as a result our knowledge of the etiology and to some extent the pathology as well has suffered. Thus our knowledge of osseous cysts warrants a report of such cases. In this paper no effort is made at statistical study, but it is merely a brief résumé of the knowledge gained from the reported cases, together with the consideration of five cases that I have observed recently in the Boston Children's Hospital.

Virchow, from a study of his two cases, concluded that the cystic formation was due to misplaced island of epiphyseal cartilage undergoing liquefaction. He found in both of his cases cartilaginous elements in the cyst wall. Since more cases have been

studied it has been found that it is only a small percentage of cases that such cartilaginous elements can be demonstrated, and then only in cases occurring near the epiphysis. Bloodgood, who has made a careful pathological study, believes that even in those cases where cartilage has been demonstrated it has not been found in sufficient quantity to warrant the assumption that liquefaction of the cartilage was the cause of the cyst. It cannot be denied, however, that these cysts are prone to occur just where misplaced cartilaginous elements are often seen. I have in mind a recent case in a rickety child in which the roentgenogram showed a triangular area of decreased radiability about one-half cm in diameter in the inner tuberosity of the tibia. This area was clearly defined. When cut down upon a material was removed which on microscopic examination proved to be cartilage.

Again it is hardly to be doubted that cysts follow trauma. In this class, then, a hemorrhage into the medulla absorption of the trabeculae and a surviving osseous fragment recently reported such a case, and in one of my cases there is a distinct history of trauma.



Fig. Case. Note point of fracture, slight degree of impaction and mu broom g of the femur.

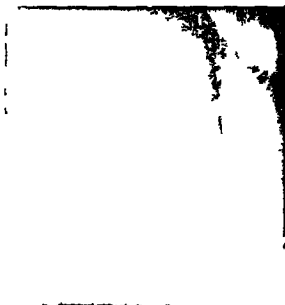


Fig. Case. Rontgenogram at the end of 6 months showing how well the bone has filled.

In the *ostitis fibrosa* of von Recklinghausen there is practically always some degree of cystic formation and thus has unfortunately led to the application of the term *ostitis fibrosa* to all the benign cysts found in children which cysts seem to be dependent upon no systemic disturbance whatever. *Ostitis fibrosa* as described by von Recklinghausen is a disease of the general skeleton with local manifestations and the cyst formation is secondary. Multiple benign cysts of what we may call the idiopathic variety are extremely rare. Von Recklinghausen's disease is a medullary fibrosis characterized by a tendency to form cysts and often involving the cortex to a mild degree. Sections from these lesions have often showed giant cells and one should be careful in this condition in not interpreting the presence of these giant cells as meaning a priori malignancy. From the reported cases it would appear that *ostitis fibrosa* has a tendency to occur a little later in life than the type of cyst first described by Virchow. However von Heberer reports a case that could be traced back as far as the third year of life.

Cysts have been noted in osteomalacia. This is a condition that would not lead one

to expect cystic formation. Pathologically osteomalacia is a disease characterized by a hyperplastic medullary process the medulla increasing in size as the cortex diminishes in thickness. Thus we see that this condition is essentially a hypergenetic one. Blood good cites the cases of Lugel and Hirschberg the former's case being definitely shown to be osteomalacia by both history and pathological examination. At necropsy of this case multiple cysts were found.

Paget's disease of bone is another hyperplastic condition in which cysts have been reported. The cases reported are hardly typical and it is probable that cyst formation in Paget's disease is extremely rare.

Parasitic cysts are fairly common due most frequently to the *echinococcus hydatidus* or the *cysticercus*. In these cases the fluid may be clear and in some cases show a characteristic two layers in the cyst wall. Often instead of this clear fluid in which the hooklets or scolices may be readily found the contents may be inspissated and caseous to such an extent as to simulate closely a tuberculous process. In this type of case the hooklets are not so easily found as the parasite is dead and prolonged search may be neces-

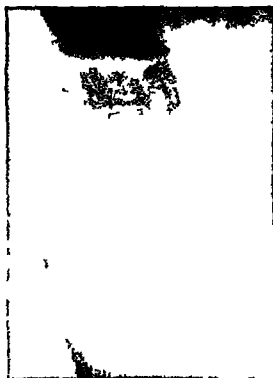


Fig. 1. Case 1. Cyst of the left femur. Note the slight trabeculation. The cyst might be easily mistaken for giant cell sarcoma.

sary. A low grade osteomyelitic process has been known to develop at the site of these parasitic cysts which might obscure the diagnosis to some extent.

In summing up the etiology it would appear that benign bone-cysts may result from several different factors and that certain cysts are a part of a constitutional disease. It seems to be the tendency to consider the cases occurring in young individuals as a low grade inflammatory process followed by absorption and liquefaction. Cases 1 and 2, 4 and 5, I think, should be placed in this class. Case 3 is in that class associated with osteitis fibrosa.

PATHOLOGY

Not considering the cystic change sometimes occurring in sarcoma and in other bone tumors, the fluid contents of these cysts at operation are never distinctly hemorrhagic. The fluid varies in consistency and color

but is usually thin and sero-anguineous. Blood cells and coagula are occasionally seen. Blood-cells could not be demonstrated in the material obtained from Case 2 though the fluid looked hemorrhagic. Cartilage may be demonstrated in the cyst wall in small quantities but most cysts do not show such structure. In fact none of our cases showed cartilage nor did they show giant cells which are often found. Often there is a definite lining membrane which is usually friable. Of the three cases reported by Mr. Robert Jones and David Morgan only one showed a distinct lining membrane. The cavity of the cyst may show a myxomatous or soft fibrous material such as was noticed in Case 3. The cavity may be trabeculated by osseous structure as in the case of Beck. The trabeculation sometimes makes the cyst multilocular. The periosteum is usually normal or thin; the cortex shows thinning and often adapts itself to fusiform enlargement to a marked degree before undergoing spontaneous fracture. In most of the cases the cyst is situated near the epiphysis of the bone though some occurred in the shaft. The long pipe bones are the ones usually affected particularly the femur, humerus and the bones of the leg. Bust has had the unusual experience of seeing several cysts of the mandible. The age at which these cysts are prone to occur is usually during the first two decades of life, more cases occurring up to ten years than between ten and twenty. The condition is sometimes seen after twenty as in Koenig's case his patient being forty. Usually however the disease manifests itself before complete epiphyseal ossification. Thus we see that the time of onset does not differ materially from that of sarcoma, a fact that must always be taken into consideration in the differential diagnosis. Perhaps the first sign of trouble is limp if the lesion is in the lower extremity. At times nothing is noticeable but the limping for several months. Three out of five of our cases showed limping as the first symptom. When the condition has progressed very far there is tenderness and a certain amount of pain. A large number of cases have been noticed in clinically by spontaneous fracture as in

Case 1 the fracture resulting from a very slight trauma. At times there is swelling, but this is usually a late sign. In one of the series swelling was the first thing noticed while in two of the cases there was no visible enlargement. In Case 2 where there was a large cyst below the trochanter the circumference of the affected side over the cyst was 75 cm greater than a similar measurement on the other side. This was negligible.

Pain is often inconstant and often paroxysmal in character. It is rarely very acute. It may be referred as in Case 2 the pain being referred to the hip-joint and the inguinal region of the affected side the cyst being well below the trochanter. In this case also there was an elevation of temperature to 102.1 several days before operation accompanied by increased tenderness over the cyst and complaint of throbbing pain. From these symptoms we thought that an infected cyst would be found at operation in spite of the fact that these cysts are usually sterile. There was no infection however no growth being gotten from the fluid. There is no symptom or sign which is constant enough to be termed characteristic of these lesions.

The diagnosis of benign cyst is established chiefly on the X-ray examination but ultimate diagnosis must be made at operation. In the differential X-ray diagnosis medullary sarcoma, simple myeloma, tuberculous, central necrosis and some cases of bone abscess must be taken into consideration the difficulty of differential diagnosis being in the order named. The chief difficulty in diagnosis will be between giant cell sarcoma involving the medulla the two conditions presenting much the same picture. However cysts as a rule have a more definite outline they are translucent and the expansion of the cortex is fairly even. The cavity may show trabeculation but this is not so distinct or so constant as the trabeculation seen in medullary sarcoma (Fig. 10). The Italian lay emphasis on the marked trabeculation of some cases of sarcoma being most significant from the fact which we have studied here this is not true. When occurring near the epiphysis all the cysts do not show any tendency to invade the line

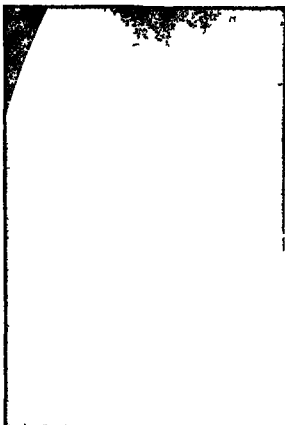


Fig. 4. Case 1. The bone is filled with cysts taken three months after operation.

The more malignant signs of sarcoma are easily differentiated by roentgenoscopy for in these there is usually more involvement of one side of the bone and translucency is not present. In these cases there is diminished radiability of the tumor as a whole.

To exclude myeloma one should X-ray the general skeleton for other foci and examine the urine for Bence Jones bodies. Myeloma usually shows multiple lesions in the thinning of the protein of Bence Jones (pathognomonic of this condition).

Low grade bone abscess can be differentiated by the thinning rather than a thinning of the cortex forming the wall of the cavity.

Although not much attention has been given in the literature to the exclusion of tuberculous the roentgenogram in Figure 9 of the



FIG 5

Fig 5 Case 3 Notice the very regular outlines of the cyst. Marked transluence and absence of trabeculation. Note the fact that there is no invasion of the epiphysis.

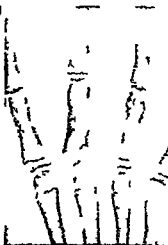


FIG 6

Fig 6 Case 3 The bone has hardened and ossification has taken place three months after operation.



FIG 7

Fig 7 Case 4 Cyst of the internal cuneiform.

tibia of a boy $3\frac{1}{2}$ years of age forced a consideration of bone-cyst. Clinically this patient showed a slightly swollen and tender ankle but the ankle joint did not show the restriction of motion that one would expect to find in a tuberculous condition. This boy gave a history of slight lump for two years before he was admitted to the clinic. The X-ray did not show the irregular borders usually seen in tuberculous and there was a mottling present. The thinning of the tibia opposite the tibial lesion could not be explained except from pressure—this point naturally suggesting sarcoma. The cavity in this case showed a tendency to extend up and down the medulla rather than to enlarge laterally such lateral enlargement in the opinion of Bloodgood being in favor of medullary sarcoma rather than cyst. The striking point in the roentgenogram is the fact that the process has invaded and has gone through the epiphysis. From this alone we made a tentative diagnosis of tuberculous and operation verified the diagnosis the cavity being full of caseous material which was tuberculous.

Perhaps the best diagnostic suggestion is to use the X-ray freely in vague conditions referable to the long bones in children and

then not to be too dogmatic in the diagnosis of benign cyst but await the exploratory incision.

TREATMENT

In those cases which have undergone spontaneous fracture the treatment should be that of any simple fracture at the same site. In Case 1 this plan was carried out with excellent result. It seems that if the cyst wall is broken and the fluid contents extravasated into the tissues, bony reproduction will take place.

If fracture has not taken place operative interference is always indicated. Dr J B Murphy was kind enough to give me his opinion of the treatment. He thinks that in those cases that show serosanguineous fluid with a fairly good cortex after enucleation of the so-called limiting membrane the cavity should be filled with a fragment transplant from some other portion of the body as this aids osteogenesis. He thinks that if there is much elliptical enlargement or other deformity of the bone a subperiosteal resection of the diseased area should be done and a large fragment transplanted that gives immediate support. Both Dr Murphy and Dr Golden have had a case that involved the upper part of the humerus the process



FIG 8

Fig 8 Case 5. Extreme thinning of the shaft and unusual translucency of epiphyseal invasion.

Fig 9. Tuberculous simulating cyst. Note the fact that the cavity extends up and down the shaft and that the epiphysis is much affected. Note the trophy of fibula. Both sarcoma and cyst had to be excluded in this case.

invading the substance of the head but not affecting the articulating surface. In both cases a resection of the diseased area was done and a bone fragment transplanted. They completely excised the head of the humerus and secured the upper end of the transplant in the glenoid cavity. Both of these cases showed excellent results, the patients having functional shoulder joints several months later.

Most cysts have been merely curetted and packed. This procedure will give good results but there is a slight danger of setting up an osteomyelitis which might so affect the diseased bone as to convert the part into an infected compound fracture. Curettage and packing with gauze tape was done in Case 3.

Some have advised enucleation of the lining membrane, the cavity then to be left to fill in with blood clot—the so-called aseptic blood clot of Schede.

It would appear that the bone filling material of Mosetig Moorhof is particularly ap



Fig 9. Medullary sarcoma of the lower end of the femur. Note the extreme trabeculation and the lateral enlargement. Type of sarcoma most frequently confused with benign tumor.

plicable to these conditions. This material has usually been used in old osteomyelitic cavities that could not be made aseptic and has therefore fallen into disuse. Used in the sterile cavities of bone-cysts there is no reason why it should not aid reproduction of bone.

Osteotomy has been done for the correction of deformity. Though most writers on the subject object to resection of these cysts and bone transplantation in those cases which show marked deformity and extreme thinness of cortex it would appear that such treatment is justifiable.

CASE 1. White girl, age 7. Family history, negative. Previous history, irrelevant.

Present illness. Seven months before admitted child was noticed to have left-sided limp. Six weeks before admitted the limp became worse and the patient suffered considerable pain in the leg being referred to the entire right thigh. Two days ago

while playing she twisted her thigh rather suddenly and has not been able to walk since the pain being worse and her right hip tender.

Physical examination. On palpation of the right hip there is considerable tenderness which prevents satisfactory examination without ether. The left hip is abducted and rotated outward. The left thigh is swollen and its circumference one and one-half inch greater than the other. The left lower extremity was three inches shorter than the right. The X-ray examination showed a spontaneous fracture just below the great trochanter probably due to a cyst. There is impaction and much rooming of the fragments. The fracture was put up in Buck's extension with 15 pounds weight and two days later X-rayed. The patient was kept in Buck's for nine weeks and then a spica plaster applied. At the end of six months the child walks without any limp; there is no shortening and the limb is apparently normal. The X-ray shows regeneration of bone in the cyst cavity (Fig. 2).

CASE 2. Boy aged 1. Family history negative. Previous history, lacerations of childhood, no rickets.

Present illness. Two years before admitted the patient fell and injured his left hip. Immediately after the injury the patient could not walk because of pain but could get about the next day without limping. Three months after the injury chronic limp was noticed and the boy complained of soreness in his left groin. From this time on these limping attacks were intermittent and during the interval between attacks he would suffer no trouble whatever. During the last two months the condition has become worse; the patient complaining of soreness and tenderness in left groin. No night cries or swelling, no position of the limb favored by patient. General health excellent.

Physical examination. The chest and abdomen are negative. Local. There is a left-sided limp. In the standing position there is slight lateral deviation of the trunk to the left. Lying down there is no perceptible difference in the size of the two thighs. On the posterior aspect of the left thigh just below the great trochanter there is suggestion of bony thickening. Flexion of the left thigh, 110 degrees less than that of the right and there is about the same degree of limitation of abduction, no limitation of hyperextension. At the extremity of flexion abduction and extension the patient complains of pain referred to the inner side of the left groin. X-ray showed a cyst just below the trochanter (Fig. 3).

Operation. Under an Eschmarch bandage, a 1 1/2 inch incision was made over the tumor and a trap set for the thigh just below the trochanter. The periosteum was removed. It was secured and tripped back. The malleus was then inserted with a gouge. The cortex was thin but firm. With removal of a small portion of the cortex much of the serum was poured. The fluid was poured of coagulation. The removal of the incision was made in the same way. The incision was closed with all the usual precautions.

and the cavity packed with gauze tape. This tape was removed in 24 hours. Convalescence was uneventful, no symptoms present six months later.

Microscopic examination. The cuttled material showed no giant cells or cartilage. There were a few masses of necrotic bone. Localized this bone was removed with the cuttled material.

CASE 3. Boy aged 5. Family history negative. No tuberculous history in family. Previous history. Has always been well except for an attack of acute rheumatic fever involving the knee three years ago. Was in bed one week at that time and made an uneventful recovery.

Present illness. Five months ago patient fell from bicycle and suffered numerous traumatic lesions of the injuries being serious. Shortly after the fall however the middle finger was noticed to be a bit swollen and tender.

Physical examination. On the radial side of the base of the middle finger of the left hand there is slight swelling and induration, some little restriction of motion at the metacarpophalangeal joint. The X-ray showed a probable cyst (Fig. 5).

Operation. The cavity was incised and curetted out. There was soft and myxomatous-like material in the cavity. The skin wound was closed without drainage. There was no infection. Microscopic examination showed granulation tissue but no giant cells or cartilage. Two and one-half months later the cavity filling was well (Fig. 6). We take this case to be osteitis fibrosa.

CASE 4. White girl aged 9. Family history negative. Previous history, usual diseases of childhood.

Present illness. Five months before admitted to the clinic patient commenced to suffer pain in left foot associated with slight limp. There has been no history of trauma. The patient complains of some pain in the left knee but there are no night cries or a febrile disturbance.

Physical examination. The general physical condition of the child is good. Locally there is a distended and slightly swollen area over the inner aspect of the left foot. This swelling is not distended. The X-ray examination (Fig. 7) showed a cyst of the internal cuneiform. No operation was advised. This was referred so the arch was supported with plaster. Six months later the tenderness and limp had practically disappeared and the cavity was filling in nicely.

CASE 5. Boy aged 9. Family history negative. Previous history, rickets.

Present illness. While jumping rope two weeks before admitted patient twisted his left ankle. There was a little pain at the time which continued but it has not been a trouble since.

Physical examination. General condition good. Locally there was a slight swelling over the distal end of the left foot. The swelling was a little tender and distended back to the injury. X-ray showed benign cyst of the lower end of the fifth metatarsal (Fig. 9). Operation was advised and performed.

ACCESS TO THE DEEPER ORBIT

By WILLIAM VAN HOOK, A.B. M.D. CHICAGO

FOR the treatment of surgical conditions involving the deeper orbit the preliminary temporary resection of the outer wall of the cavity a practiced by Kroenlein is most advantageous especially when foreign bodies tumors and abscesses demand investigation (see Fig. 1)

Kroenlein's operation involves the trans section of the zygomatic process of the frontal bone as far as the inferior orbital fissure (to a point 1 cm. posterior to the sphenozygomatic fissure) then the frontal process of the malar bone is divided at its base and the mass of bone is turned back with the preservation of its attachments to the soft parts.

Czermak has modified the operation by increasing the amount of bone reflected. He divides the malar bone at its junction with the superior maxilla then makes the incision through the frontal process of the malar bone.

The excellent exposure of the deep orbit is well adapted to the grosser surgical requirement. But for such operations as the peripheral extirpation of the first and second branches of the trigeminus it is unnecessarily destructive. Of course when extreme measures are to be adopted for trigeminal neuralgia

it is best to proceed at once to the removal of the gasserian ganglion.

The following case suggested a method of providing satisfactory access to the middle depths of the orbit.

Mrs. A. age 60 was operated upon nine years ago by the writer for neuralgia of the first and second branches of the fifth nerve; the extraction of those nerves at the points of exit from the supra-orbital and infra-orbital foramina. Care was taken to extract as much as possible of the nerve trunks. The patient was wholly free of neuralgia for five years. After the return of the suffering he was operated upon one year ago by another surgeon who cut down through the old scars. Whatever he may have accomplished anatomically the pain disappeared for several months.

After the pain had reasserted itself she came to the writer again Dr. C. A. Hilbert being the attending physician.

It seemed most undesirable that extension of the gasserian ganglion be practiced for the pain was

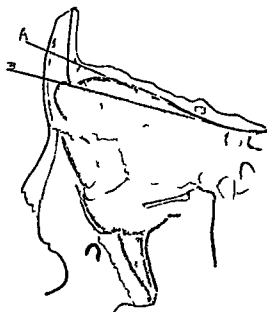




Fig. 3 After Spalteholz. Line EF shows the course of the supra-orbital branch of the trigeminal nerve exposed to the periphery of the orbit by removal of that portion of the frontal bone lying below that line. Similarly the infra-orbital can be isolated at the base of the orbit by removing bone along line GH or CD.

distinctly limited to the supra-orbital region and the inner canthus of the left eye. On the other hand it seemed probable that the stump of the superior branch was but short and that any attempt at excision must be made after careful planning to reach a rather deep level within the orbit. Kroen-

lein's resection was thought to be too destructive for a partial operation. If the ganglion were not to be attacked then the operation should consist merely in a more thorough peripheral excision. Through the kindness of Dr. P. Ransom and Dr. Chase of the Anatomical Department of Northwestern University Medical School it was possible to make a study of the matter upon the cadaver.

It was conceived that the systematic removal of that part of the anterior lower margin of the frontal bone which overhangs the orbit would open a channel which would lead with great directness and considerable freedom toward the apex of the cavity. Trial upon the cadaver easily confirmed the notion.

Accordingly after the patient had been prepared in the usual way the operation was undertaken under ether anesthesia. A cylindrical sandbag was put under the patient's neck and as the head had been allowed to rest upon the occiput it was easy to turn the face upward and downward to occupy any desired plane. By tilting the head slightly backward the affected left eye was so turned that the operator who sat behind the patient's head could look down easily into the orbit after the removal of the necessary bone.

The first step consisted in making an incision through the skin and connective tissue down to the original site of the supra-orbital nerve. The levator palpebrae superioris was cut and the attachment of the orbital periosteum separated from the superciliary arch.

While this work was proceeding a careful search was being made for the regenerated nerve. A cord-like mass was discovered and followed toward the apex of the orbit. It entered the fat of the orbit



Fig. 4 This picture and Fig. 5 are from the same specimen. In Fig. 4 the superior orbital edge is intact. See Fig. 5 for comparison.



Fig. 5 Photograph of the specimen shown in Fig. 4 after removal of the superior orbital edge. Compare the new view of the orbital roof.



Fig. 6 Another orbit of till more mammalian origin. Note the exposure which the bony ring gives when the opening through the orbital rim is

a short distance from the bone margin and could be followed back to the temporosphenoidal fissure. But this exploration was not carried out fully until the superciliary arch had been removed.

It will be seen that such a part of the frontal bone is to be removed as will expose the superior plate of the orbit without obstruction to vision by the overhanging arch.

This is the essential point in the method practiced viz the free removal of the superciliary projection until the orbit is widely open. The superior wall of the orbit forms a relatively plane surface which makes a boundary for the operator above which he cannot wisely pass. But this plane he cannot use as the limit of his activities until he has removed the eaves like projection of the frontal bone that overhangs the cavity of the orbit.

With a small rougeur forceps the bone was quickly gnawed away. The head being in an inverted position the roof of the orbit now constituted the floor or base of the field of operation. The exposure of the anterior upper orbital space was found to be excellent. Dissection and the following of the outer course of the supposedly regenerated nerve-trunk was satisfactory. The temporosphenoidal foramen could be located and the nerve structure followed down almost to it. With care and by the use of properly chosen slender and accurate in-

struments the dissection could be carried to the temporosphenoidal foramen.

In the case under operation the nerve trunk was followed almost to the foramen and then extracted. This exeresis was the less satisfactory for the reason that the previous operation had left but a weak string of tissue to draw upon.

The mass having been extracted the severed deep tissues were reunited with catgut the skin sutured and the wound dressed.

There was some subconjunctival hemorrhage and chemosis. But with boric acid irrigations this soon disappeared.

As yet there has been no recurrence of neuralgia. Some drooping of the eyelid persists.

This preliminary operation is recommended for cases requiring delicate manipulations in the anterior and middle upper orbital space especially in the removal of the first branch of the trigeminus.

The writer believes that by its use the extraction of the supra orbital nerve will be much facilitated and the results improved. Recurrences of neuralgia usually take place because of failure to extract the trunk far enough back to include branches which may be the starting point of the pain.

An exactly analogous procedure is adapted to the infra-orbital extraction of the second branch of the trigeminus.

CONGENITAL DEFECTS OF THE ANUS AND RECTUM

By EDWARD C BRENNER M.D. N. Y.

ABNORMALITIES of the distal end of the gastro-intestinal tract were mentioned by the ancients. Paula Aegineta as early as the seventh century described a successful operation for the relief of anal obstruction. A bistoury was plunged through the perineum into the rectum and the artificial anus systematically dilated by bougies. The crude method was in vogue until 1835 when Amussat recommended a true proctoplasty by careful dissection of the parts and suture of the rectal cul de sac to the anal site. Stromeyer in 1844 advocated opening the pelvic peritoneum when the rectum was not found and

exploring the pelvis for it. About the same time the French school advised inguinal colotomy when perineal section failed. Bo denhamer in 1860 wrote a comprehensive chapter on the classification and treatment of the various abnormalities. Cripps later collected 100 operative cases and reported them in 1887. Since then little attention has been paid to these important malformations and the most recent textbooks quote time worn statistics. It is the purpose of this paper to present the results of a study of 61 of these cases that have been treated since the advent of aseptic surgery.

Recto-anal malformations result from



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faulty embryological development during the first two months of fetal life. The rectum and anus are developed separately the former from the ectodermal and the mesodermal layers of the blastodermic membrane the latter from the epidermal. Very early the lower end of the primitive intestine is connected with the neurenteric canal (post anal gut). This union soon disappears and the gut terminates in a cloaca common to it and the urachus. During the second month the perineal partition is formed dividing this cavity into the urogenital and the rectal segments. Simultaneously a depression at the anal site is formed in the skin (proctodeum). This depression lined by epiderm extends inward to meet the blind rectal pouch into which it opens.

Failure on the part of nature to form a depression in the skin sufficiently deep or failure of the rectum to descend sufficiently to meet the anal depression or an arrest of development of the tissues between the rectal cul de sac and the genito-urinary tract may result in the following malformations:

1 Atresia ani

- 1 Partial occlusion or narrowing of the anus
- 2 Complete occlusion of the anus by a membranous diaphragm
- 3 Total absence of the anus the rectum ending in a blind pouch
- 4 Total absence of the anus the rectum opening into the bladder urethra uterus vagina perineum or sacral region



Fig 2 Greatly distended stomach containing mass of fluid. Lower arrow indicates stenosed pylorus.

B Atresia recti

- 1 Partial occlusion or narrowing of the rectum
- 2 Complete occlusion by a membranous diaphragm
- 3 Complete absence or extensive obliteration of the rectum
- C Rectum and anus normal but uterus, or vagina emptying into the rectal cavity
- D Absence of the large intestine rectum and anus
- E Rectal diverticula

INCIDENCE

It is impossible to obtain reliable statistics as to the relative frequency of these malformations. Many infants probably die from intestinal obstruction from rectal imperforations without the exact condition being recognized. Most of those with abnormal openings compatible with life are not reported. From such statistics as we have however it appears that some type of recto-anal malformation occurs once in approximately every 5000 births with the sex ratio five to three in favor of males. Anal defect

Cripps in 1911 by of 18000 births found 7 cases of anal malformations. Of 100 births at New York Lying in nurse hospital reported abnormal defect. Of 30 births at St. Elizabeth's hospital there were 2 cases of atresia of superior rectum.

are the most frequent. Malformations with abnormal openings i. e. vaginal or urinary comprise the next most common group. The other varieties are extremely rare.

In cases of partial occlusion of the anus or rectum the narrowing may be very slight or may reach such a degree as scarcely to admit of the passage of meconium. Usually the narrowing is annular resembling a stricture formation. Occasionally a considerable extent of the bowel is involved as in a case reported by Cheever where the narrowed portion included 18 inches of the bowel with a lumen the size of a goose quill. (Narrowing of the recto-anal segment rarely may result from foetal proctitis with ulceration and cicatricial contraction.)

If the stricture is tight it will give rise to symptoms of obstructive ileus. The diagnosis is easily made by a digital examination as the narrowing is usually near the anus. Some cases give no focal symptoms and reach adult life suffering only from obstinate constipation. Their congenital nature is determined by the absence of any disease which could produce them and by the absence of ulceration.

The treatment of this form of obstruction consists either in gradual dilatation or in proctotomy. Palliative treatment should first be employed but frequently a free division of the stricture or its complete excision is necessary for permanent benefit.

In occlusion of the anus by a membranous diaphragm the obstructing membrane is of variable thickness and firmness and is composed of either skin or mucous membrane. In very thin septa bulging may occur when the child strains and occasionally such type ruptures spontaneously. In some cases a small perforation is present which permits of the escape of fluid meconium thus masking the condition until the faeces become solid and obstruction ensues. The diagnosis is self-evident upon local examination. Treatment consists in a crucial incision of the membrane. If the redundant flaps are dense they should be excised and the canal systematically dilated with bougies. The operation should be performed early and no antiseptics required. Unfortunately this

condition which is so amenable to treatment is one of the rarest of anal malformations.

Total absence of anus the rectum ending in a blind pouch. These cases are the most common type of anal deformities. There may or may not be a dimple at the normal anal site and the external sphincter muscle may be normal poorly developed or entirely absent a dense fibrous or fibrocellular mass replacing it. The blind rectal pouch may be normally situated in the sacral hollow just above this or lie loosely above the pelvic brim or be attached to some adjacent part. The intervening space between it and the perineum may be filled up with cellular tissue or a distinct fibrous cord may extend downward to the anal site.

Many cases are overlooked at birth especially if the anal dimple appears normal and rectal temperature is not taken. Absence of meconium discharge and progressive abdominal distention soon call attention to the condition. Distention is a late symptom usually not occurring in the first 48 hours as the intestinal tract of the newborn is sterile. Unrelieved these cases succumb in a few days although in rare instances life may be sustained over a long period one case being reported to have lived seven weeks. There is increasing restlessness abdominal distention and inaptitude for food. Vomiting is a late symptom and may be absent.

Opinion is divided as to whether operative interference should be attempted at once or after 48 hours. Dely has been recommended in order to give the rectum time to distend and be more prominent. Such advice is erroneous as the meconium becomes less thorough absorption of its fluid content. Moreover by the third day the intestinal tract is contaminated. If the child is in good condition operation should be performed in the first 24 hours.

It is impossible to determine accurately the position of the rectal pouch. The presence of a slight anal depression is no indication of its proximity. Likewise the bulging of the perineum on straining gives little dependable evidence that the rectum is intrapelvic. Exploration of the bladder or vagina may be helpful if either fills

up the concavity of the sacrum it is proof that the rectal cul-de-sac is high up. Abnormal narrowing of the distance between the tuberosities that is less than 2 cm for a normal sized infant, is highly presumptive evidence that the rectum is extrapelvic. In approximately 90 per cent of cases, the rectum is intrapelvic in its normal situ.

Proctoplasty is indicated unless the evidence is very strong that the rectal cul-de-sac is high up. Light ether anaesthesia should be employed. Good light and retraction are indispensable as the parts are very small. The patient is placed in the exaggerated Trendelenburg position with thighs flexed on abdomen. A sound or probe is passed into the bladder as a guide. The incision is made along the perineal raphe from the tip of the coccyx to the scrotum or fourchet and a blunt dissection cautiously deepened in the midline following the curve of the sacrum. The distended greenish rectal cul-de-sac may be seen upon separating the areolar tissue. This should be brought down and sutured with a double row of Lembert stitches to the perineal margin or to the external sphincter if present. If there is difficulty in pulling down the rectum due to its high position, the coccyx may be bisected or the rectum sutured in its site. If external sphincteric fibers are present they may be secured by Gersuny's procedure or axial rotation of the gut or some other fibers from the gluteal region may be inserted in a figure-of-eight fashion surrounding the bowel. The pouch may be opened once if greatly distended or an interval of 12 hours may elapse although little or no fecal material is present. It is not advisable to dissect a greater depth than 1 cm in search of the cul-de-sac. It is likewise unwise to open the pelvic peritoneum unless the pouch is seen just above. Blind peritoneum with a trocar is absolutely contraindicated.

Too much time should not be sacrificed in searching for the rectal pouch. The entire operation should be completed in five to eight minutes. If unsuccessful a high colostomy should be speedily performed. Occasionally upon opening the

abdomen the rectum may be sufficiently low to be grasped by dressing forceps and pushed down through the pelvic peritoneum to the anal site (coeliotomy and combined proctoplasty). In rare instances the sigmoid is found on the right side. The immediate results of proctoplasties are excellent. The exceptional cases with well-developed external sphincteric fibers give permanent good results. Most of the others do not result in a useful anus there is variable incontinence and bougies must be systematically employed to prevent cicatricial contraction.

Total absence of anus the rectum opening into the bladder urethra uterus vagina perineal or sacral region. This class comprises 40 per cent of all cases. The type most common to it is that in which the rectum opens at the fourchet. In females the opening is very rarely into the bladder but occasionally it opens into the urethra. In males it more often opens into the bladder than into the urethra. This communication with the bladder may be a direct one or by means of a narrow duct running through the bladder and opening into the bas fond between the ureteral orifices. In the very rare cases where the bowel has opened into the uterus the rectum as well as the anus is absent. Openings into the sacral region or abnormal portions of the perineum are by fine fibrous fistulous tracts and the rectum is high up.

Cases with a large opening into the fourchet may present no symptoms of obstruction and are compatible with longevity and conception. Morgagni reported a woman living one hundred years who bore several children and never knew of her abnormality. If the opening is small obstructive symptoms appear as the feces change from fluid to solid consistency. Several of these types have good sphincteric control. In early childhood these cases should be treated by dilatation of the fistulous opening. Proctoplasty with an attempt at a radical cure should be deferred until late prepubescence when the parts are well developed and should be resorted to only after systematic dilatation has proved futile. A bent probe is passed through the vaginal opening and

turned downward toward the perineum thus marking the end of the rectum. This is cut down upon by a median perineal incision extending from the coccyx to the labial opening the pubococcygeal fibers of the levator ani being carefully divided. The rectum is then thoroughly freed from the vagina until without much traction it can be placed in the posterior angle of the wound as near as possible to the coccyx. An important point in the technique is to include a small area of tissue about the labial orifice as sometimes circular muscle fibers are present which have a sphincteric action. This margin of the anus is then sutured by the Lembert method to the posterior angle of the wound the divided fibers of the levator ani united anteriorly the opening in the vagina closed and the perineal edges approximated. It is essential to place the anus far posteriorly as cicatricial contraction tends to draw it nearer the vagina. The artificial anus may require subsequent dilatation or may later be enlarged by a posterior incision. The operation permit of good repair but continence of feces is rarely good. Most artificial ani give a trumpet shaped anus without sphincteric control and easily permit of the prolapse of mucosa.

In cases with communication between the rectum and urinary tract the symptoms vary according to the location of the abnormal opening. In rectovaginal fistulae the urine is admixed with meconium rendering it thick and greenish. The quantity of meconium passed is an index of the size of the fistulous opening. This condition is generally fatal early in life from the development of cystitis with a ascending kidney infection or from intestinal obstruction. Rarely nature is tolerant of such defect and infection does not occur. When the communication is urethral in the male meconium is passed independent of micturition and the first urinary flow may be meconium stained the fecund feces in clear. A large fistulous opening of this type is compatible with life and sexual potency.

Cases with vesicourethral communication require early surgical intervention as only the rare exception escape ascending kidney infection.

Operation for the radical cure of vesical fistulae is attended with great peril in early life. Inguinal colostomy is the procedure of safety. This may allow the fistula to close by diverting the fecal stream through a less stenosed opening. When the parts are well developed a proctoplasty may be attempted and the colostomy closed. The patient is placed in the lateral prone position with a catheter guide in the bladder. A long median perineal incision is deepened through the levator ani and the rectum isolated and freely dissected from the bladder. The vesical opening is freshened and carefully sutured. The rectum is then stitched down to the normal anal site or to the sacral wound and the parts allowed to heal by granulation. Continuous vesical drainage with daily irrigations should be maintained several days.

Partial occlusion or narrowing of the rectum is a rare type and occurs about the level of the peritoneal reflexion or at the rectoanal junction. In most cases the condition is one of a perforated septum composed of thick fibrous tissue lined above and below with mucous membrane like a hymen. Occasionally multiple septa occur. Symptoms of obstruction are dependent upon the size of the opening and fecal consistency. The diagnosis is apparent upon local examination. The presence of a normal anus may mislead as to the true condition. Treatment consists in a crucial division of the septum excision of the flaps and systematic dilatation with bougies to prevent stricture cicatrization.

Complete occlusion by a membranous diaphragm resembles the above case save that the septum is imperforated. The symptoms are those of complete obstruction the diagnosis is self evident upon examination and the treatment the same as above described.

Extensive obliteration or complete absence of the rectum is almost always attended by the absence of the anus. Many cases are imperforate anus operable upon by the perineal route in which the rectal pouch is not discovered falling into the class of blind ending rectum for it entirely may be replaced by a fibrous cord. In these cases other signs of retarded development are usually

ly present, the distal portion of the colon most frequently showing in the defect. Colostomy offers the only life-saving procedure.

Cases of normal rectum and anus but with ureters ulcers or vagina emptying into the rectal cavity are rare fetal curiosities. They result from lack of proper development of the perineal partition dividing the cloaca into the urogenital and rectal segments. The condition is usually attended by other evidences of fetal developmental arrests.

Absence of the large intestine, rectum and anus occasionally occurs in monstrosities and the abnormal opening may be at the umbilicus in the thoracic wall or at some distant site as in the face.

Rectal diverticulae are extremely rare and like Meckel's diverticulae or those of the colon involve all the coats of the bowel. They are prone to fill slowly with fecal material and give symptoms of pressure from tumor formation or those of peritonitis from rupture. The diagnosis is possible by proctoscopic examination or radiographic findings after bismuth injection but of the few reported cases the condition was determined only after exploratory laparotomy.

PROGNOSIS

The prognosis depends upon the nature of the malformation and the condition of the patient. It is well recognized that congenital defects have a lowered resistance. A factor hitherto unemphasized however is the not infrequent concurrence of multiple congenital defects, i.e. stenoses elsewhere in the gastro intestinal tract, polycystic kidneys et cetera.

Practically the cases of anorectal malformations fall into two classes: (1) Imperforations with complete obstruction demanding immediate operative interference and (2) those with fistulous opening. In cases with complete obstruction the surgical indications are (1) to establish fecal drainage and (2) to supply an outlet that will if possible imitate the natural anus in both function and position.

Prior to aseptic surgery the average mortality for all types of operations for the relief

of anorectal malformations was about 50 per cent the mortality of colostomy and perineal puncture by means of the trocar being extremely high. With modern technique the surgical mortality is greatly reduced. Table I is a summary of the 61 cases comprising this study.

TABLE I—SUMMARY OF CASES

Types	Cases	At In	Female	Vul S	Operated	Successful	Surgical	Non-surgical	Inoperated	Died (Causes)	Survival Mort by Year
Atresia in	27	7	6	27		8	5				7
Atresia let	1	0	0						1	6	
Atresia ano	complete										
Atresia let	3										
Atresia let	no perineal out								1		
Atresia let	scrotal out								1		
Atresia rect					3		4			57	
Atresia rec	vaginal										
Atresia rec	urethral				3						
Atresia rec	outlet										00
Totals					61						8
† Died											
† Relieved											

The causes of death are tabulated as surgical and non surgical. The latter includes the cases in which there were concomitant congenital conditions incompatible with life or in which non surgical complications supervened. Thus it will be seen that of 33 operative cases 31 or 60 per cent terminated successfully. Unfortunately several records of these cases are incomplete and give no data as to the functional results of the newly formed anus. The majority of those noted however had complete or partial control. Of the 21 cases remaining for consideration 10 died of non surgical complications while 11 succumbed as the immediate or remote result of operative interference. We have therefore a surgical mortality of 26.2 per cent. The mortality is in direct ratio to the severity of the malformation. Operations for atresia ani with simple occlusion or with fistulous openings into the vulva, perineum or scrotum are attended with little danger. The

correction of atresia recti with vaginal communication is likewise a safe procedure. The mortality of 27 cases of atresia ani is 27 per cent. When in addition to absence of the anus part or all of the rectum is undeveloped the operative mortality rises to 57.1 per cent. The relief of atresia recti with urethral outlet is attended with great peril.

Table II is a summary of the types of operations performed.

TABLE II -- TYPES OF OPERATION

Operation	Cases	Died (Causes)		Typical Mortality Percent
		Surgical	Non-surgical	
Perineoplasty (mostly proctoplasty cases)	20	---	---	---
Inguinal colostomy	---	---	---	66.6
Perineal dissection for fistulous openings	---	---	---	---
Celiotomy and proctoplasty	---	---	---	---
Totals	---	---	---	20

CONCLUSIONS

Perineal dissection for fistulous openings gives excellent results and is a safe procedure. Perineoplastics for anal or anorectal obstruction in 29 cases reveals a surgical mortality of 24 per cent, a percentage much lower than that in the period prior to aseptic surgery. Inguinal colostomy though advised by some as the procedure *ab initio* is attended with high mortality (66.6 per cent) and is to be condemned except as a method of last resort. Celiotomy combined with proctoplasty is a novel and unique technique and promises good results in selected cases.

AUTHOR'S CASE. Family history negative except mother has facial lupus, father pulmonary tuberculosis. Four healthy normal children. No family stigmata. Male child born February 24, 1913, weight six pounds. Physical examination normal save for underweight and local condition. External genitalia normal, voids freely. Local extending from scrotum to coccyx is a well developed perineal raphe with a slight dimple at anal site and a suggestion of external sphincteric fibers. Slight bulging of perineum upon straining.

Operation at 24 hours. Light ether anesthesia. Patient in exaggerated lithotomy position with probe in bladder. Perineal incision extending from scrotum to coccyx deepened in midline to pelvic peritoneum (coccyx bisected). Hemostasis secured. Greenish pouch seen through peritoneum.

Latter opened and after freeing cul de sac from surrounding parts rectum was brought down and sutured with silk (Lembert) to anal site and perineal wound closed. Rectum opened with evacuation of meconium (Culture of meconium sterile). Child's condition was unaffected by operation but was placed in incubator on account of its feeble condition. Patient took feedings well. Twelve hours after operation the child vomited (projectile) large quantity of curds. Vomiting of projectile type continued at interval of four to eight hours until death 32 hours after operation. Diagnosis pyloric stenosis.

Meconium discharged freely and cultures 12 and 24 hours after operation returned sterile. Wound remained intact.

Autopsy. Chest normal. Abdomen. Upon opening abdomen stomach was markedly distended filling upper two thirds of abdomen. Lying about it are the collapsed loops of small intestine. Ascending transverse and descending colon collapsed. Upon tracing small intestine to gastroduodenal junction a distinct stricture formation presents at the pylorus. Gas in stomach cannot be forced into duodenum. Stomach easily holds 1 ounce of water. Stenosis at pylorus is complete involving both mucosa and muscularis. Liver. Gall bladder absent, no trace of cyst duct. There is a rudimentary fissure for the gall bladder in front of the right end of the portal fissure, the quadrate lobe thus being imperfectly marked off from the remainder of the right lobe. To the left it is connected with the left lobe by a well marked pons hepatis. The common bile duct is formed by the union of the two hepatic ducts and occupies its normal position in the free edge of the gastrohepatic omentum. There is no dilatation of the common duct and no intrahepatic gall bladder is present. There is no evidence of pelvic peritonitis. The pelvic peritoneum adheres to the rectum where the latter was pulled down to the anal site. The lower edge of the rectum is intact with the pelvic floor by sutures. No extravasation. Pelvic rectal space clean. Left kidney multilocular is the size of a plum. On section it is polycystic and there is little cortical tissue. Two pelvis unite in a common tortuous ureter which presents five incomplete strictures. Right kidney Multilocular slightly smaller and polycystic. Cyst contains purulent material. Ureter is distended and impervious in its lower third.

Diagnosis. Atresia recti, pyloric stenosis, absence of gall bladder, polycystic kidneys, strictures of both ureters.

SUMMARY OF CASES

ATRESIA ANI

CASE. Male age 36 hours No. 6430. Presbyterian Hospital, patient of Dr. George Woolsey. Condition good, slight distention. Abnormality: anus absent, slight dimple. Perineal operation under anesthesia. Immediate result: relief, remote result: good. Remarks: Control (?)

CASE 2 Male age 24 hours Nos 10 555-10 571 Presbyterian Hospital patient of Dr F Hawkes Condition good Abnormality anus absent slight dimple Operation (1) Perineal under novocaine (2) colostomy and proctoplasty after three weeks under ether Immediate result relief remote result patient died in eight hours after second operation Remarks Rectum high and opened *in situ* on second operation rectum was pushed down to perineum by clamp through abdominal wound

CASE 3 Female age 10 hours No 2 799 Presbyterian Hospital patient of Dr F Hawkes Condition frail Abnormality anus absent no dimple Perineal operation under ether anaesthesia Immediate result relief (?) remote result died in 48 hours Remarks Death from intestinal obstruction

CASE 4 Female age 48 hours No 3 503 Presbyterian Hospital patient of Dr Eliot Condition, distention vomiting (regurgitant) Abnormality occlusion by membrane Perineal operation under chloroform anaesthesia Immediate result relief remote result died in four days Remarks Autopsy—structure of oesophagus, cystic kidney, bicornate uterus and vagina

CASE 5 Male age 2 days No 20 Lying In Hospital patient of Dr Carmalt August 13 1908 Condition two weighing 5½ pounds frail vomiting Abnormality anus absent Perineal operation under chloroform anaesthesia Immediate result relief remote result good two weeks later Remarks Not traced

CASE 6 Male age 1 day No 48 Lying In Hospital patient of Dr Markoe November 1906 Abnormality anus absent Perineal operation under chloroform anaesthesia Immediate result relief remote result good Remarks Not traced

CASE 7 Female age 1 day No 164 Lying In Hospital patient of Dr F Davis August 29 1904 Abnormality anus absent Operation, colostomy Immediate result relief remote result good

CASE 8 Male age 1 day weight 8 pounds No 23 Lying In Hospital patient of Dr F Markoe November 8 1898 Abnormality atresia ani Perineal operation Immediate result relief remote result good Remarks Forty three days later anus in good condition the child weighing 7 pounds

CASE 9 Male age 3 days No 9 Lying In Hospital November 10 1909 Condition distention Abnormality atresia ani Perineal operation Immediate result relief remote result died in one month from intestinal stasis

CASE 10 Male age 3 days No 6 150 St Mary's Hospital, patient of Dr Dowd November 29 1909 Condition vomiting Abnormality atresia ani Perineal operation under ether anaesthesia Immediate result relief remote result good Remarks Good control April 1913

CASE 11 Female age 2 days No 2 744 St Mary's Hospital, patient of Dr Dowd July 16 1906. Condition distention Abnormality atresia

ani Perineal operation Immediate result relief remote result good Remarks Not traced

CASE 12 Male age 13½ days No 3 887 Babies Hospital patient of Dr Downes July 26 1910 Condition distention vomiting Abnormality atresia ani Perineal operation no anaesthesia Immediate result relief remote result good

CASE 13 Male age 16 days No 4 281 Babies Hospital October 910 Condition distention vomiting Abnormality two thumbs on right hand Perineal operation when twenty four hours old at another hospital Remote result good Remarks Relieved by dilatation

CASE 14 Male age 2 months Bellevue Hospital, patient of Dr Hotchkiss March 14 1910 Condition weight 8½ pounds slight distention imperforation incised by accoucheur at birth Perineal constriction incised Immediate result relief, remote result good but died in ten days from diphtheria

CASE 15 Male age 9 months Bellevue Hospital patient of Dr Vosburgh September 22 1910 Condition distention imperforation incised by accoucheur at birth Perineal operation Immediate result relief remote result good

CASE 16 Male age 3 days Bellevue Hospital December 3 1907 Condition frail distention Abnormality anus absent Perineal operation cocaine anaesthesia Immediate result relief remote result died third day from marasmus

CASE 17 Age 1 day Bellevue Hospital Abnormality anus absent Perineal operation Immediate result relief remote result good Remarks Sphincteric control but needs dilating at on 3rd

CASE 18 Age 7 weeks, Bellevue Hospital Condition distention The patient had been operated upon at another hospital at birth for absence of anus Immediate result relief remote result good Remarks Systematic dilatation no control

CASE 19 Bellevue Hospital patient of Dr Hartnell Abnormality anus absent Perineal right colostomy ether anaesthesia Immediate result relief remote result died in three weeks from marasmus

CASE 20 Bellevue Hospital Condition, distention Abnormality anus absent Perineal colostomy ether anaesthesia Immediate result relief remote result died in three days Remarks Persistent vomiting

CASE 21 Female No 2 761 Lying In Hospital August 1 1912 Perineal operation Immediate result relief remote result good

CASE 22 Male age 3 days No 15,068 Lying In Hospital August 13 1909 Condition distention Perineal operation Immediate result relief remote result good

CASE 23 Male age 24 hours patient of Dr T Cherry private communication 1910 Condition premature child weighing about 4 pounds Abnormality anus absent Perineal operation

no anesthesia Immediate result no relief remote result died Remarks Child too feeble from colostomy and died of shock

CASE 24 Female patient of Dr G W Jarman private communication about 1898 Abnormality anus absent Perineal operation Immediate result relief remote result good Remarks Complete control alive and well

CASE 25 Male age 1 day patient of Dr Joseph Wiener Mt Sinai Hospital 1910 Condition slight iters Abnormality anus absent and part of rectum deformed ears and scrotum Perineal operation no anesthesia colostomy and proctoplasty ether anesthesia Immediate result relief remote result good Remarks Good condition two months later

CASE 26 Male age 14 weeks No 4,302 Roosevelt Hospital patient of Dr Brewer 1909 Condition distention Abnormality anal stricture Operation at 24 hours at another hospital for absence of anus no anesthesia Immediate result relief remote result good Remarks Dilata tion with sounds

CASE 27 Male age 24 hours Home Hospital patient of Dr Brenner 1912 Condition, distention weight 6 pounds Abnormality anus absent no dimple Perineal operation ether anesthesia Immediate result relief remote result died in 56 hours Remarks Projectile vomiting after 36 hours pyloric stenosis absence of gall bladder both kidneys polycystic double left ureters stenosed

ATRESIA ANI—VULVAR OUTLET

CASE 28 Female age 18 days No 4,025 Presbyterian Hospital patient of Dr McCosh Condition distention anal opening admits catheter Operation postponed for better development Immediate result relief Remarks Relieved by dilatation and stapes

CASE 29 Female age 3½ years No 3 281 Presbyterian Hospital patient of Dr McWilliams Condition, no distention free movements Advised waiting for three years before operating

CASE 30 Female age 4 months No 878 Presbyterian Hospital Condition opening sufficient for free movements Operation postponed for better development

CASE 31 Female age 3 months patient of Dr Leo Buerger private communication 1911 Opening in post vaginal wall Perineal plastic operation fistula closed ether anesthesia Immediate result relief remote result good Remarks Control

CASE 32 Female age 3 months Bellevue Hospital November 4 1913 Condition feces through vulvar orifice Perineal plastic operation fistula closed ether anesthesia Immediate result relief remote result good Remarks Control

CASE 33 Female age 4 months Bellevue Hospital patient of Dr Bryant January 7 1905 Condition free movements Operation postponed for better development

CASE 34 Female age 1 day No 822 Babies Hospital November 11 1907 Condition distention Opening admits catheter movements free Abnormality three notes and two folds coccyx to right of midline Operation postponed until better developed Remarks Readmitted December 2 1907 marasmic died January 2 1908

CASE 35 Female age 4 months Bellevue Hospital patient of Dr Bryant January 7 1903 Condition feces pass freely Operation postponed until better developed

CASE 36 Female age 7 months No 38635 New York Hospital patient of Dr Johnson October 7 1909 Perineal plastic operation fistula not treated Immediate result good

CASE 37 Female age 14 years patient of Dr Jarman private communication 1912 Condition feces passed through vagina with sphincteric control Perineal plastic operation fistula closed one month later ether anesthesia Immediate result good remote result good control Remarks Complete absence of anus When five days old rectal pouch ruptured spontaneously into vagina Now has perfect control

ATRESIA ANI—COMPLETE OCCLUSION

CASE 38 Male age 2 days patient of Dr T Cherry private communication 1909 Condition slight distention occlusion by band of skin at anal orifice Operation crucial incision no anesthetic Immediate result good remote result good Remarks Control

CASE 39 Male age 2 days No 36118 New York Hospital patient of Dr Botton August 18 1908 Condition jaundice distention anus distended Operation posterior proctotomy no anesthesia Immediate result relief Remarks Discharged improved

CASE 40 Female age 1 day No 6316 Babies Hospital June 8 1912 Condition premature anus developed Abnormality malformation of heart, atresia of pylorus and duodenum Not operated upon as the patient died at birth

ATRESIA ANI—PERINEAL OUTLET

CASE 41 Female age 2½ months No 24823 New York Hospital January 25 1903 Condition good anus developed post anal outlet Operation refused

CASE 42 Male age 2 days Bellevue Hospital patient of Dr J B Walker November 21 1909 Condition fistula 2 cm in perineum Operation fistula opened Immediate result relief

CASE 43 Male age 1 day No 429 Lying In Hospital patient of D Lobenstein July 26 1906 Condition omitting No abnormality Fistula opened on director Immediate result relief

CASE 44 Male age 4 days patient of Dr W C Lusk private communication February 27 1907 No abnormality Perineal operation fistula not treated No anesthetic Immediate result relief Remarks Died a few months later

ATRESIA RECTI

CASE 45 Male age 3 days Bellevue Hospital patient of Dr Hartwell November 3 1910 Condition distention vomiting Abnormality anus absent Operation colostomy no anesthetic Immediate result relief remote result not stated

CASE 46 Male age 3 days, Bellevue Hospital patient of Dr Bryant December 31 1907 Condition distention Abnormality anus absent Perineal operation cocaine anesthesia Immediate result relief remote result died in 48 hours Remarks Intestinal obstruction

CASE 47 Male age 1 day Bellevue Hospital patient of Dr Lusk August 9 1908 Condition twin Abnormality anus absent Perineal operation cocaine anesthesia Immediate result relief remote result good Remarks Requires dilatation at one year

CASE 48 Male age 1 day No 777 Lying In Hospital patient of Dr A B Davis December 4 1908 Operation colostomy Patient died

CASE 49 Female age 4 days No 7123 Lying In Hospital patient of Dr A B Davis February 17 1906 Condition jaundice distention Abnormality anus absent Operation, colostomy (secondary) chloroform anesthesia Immediate result relief remote result died in five weeks Remarks Marasmus

CASE 50 Male age 8 days No 14 539 Lying In Hospital January 27 1909 Condition premature child Abnormality fibrous cord from anus to ascending colon Operation enterostomy chloroform anesthesia Immediate result relief remote result died in a few hours

CASE 51 Male age 1 day No 892 Lying In Hospital patient of Dr A B Davis October 10 1909 Condition distention Abnormality anus absent Perineal operation ether anesthesia Immediate result relief remote result died in four days Remarks Post operative hemorrhage

CASE 52 Male age 1 day No 1712 Lying In Hospital July 21 910 Condition good Abnormality anus absent Perineal operation chloroform anesthesia Immediate result relief remote result good

CASE 53 Age 2 days No 2253 Manhattan Maternity Hospital September 25 1910 Condition poor Abnormality congenital stenosis ascending colon Was not operated upon as the child died the second day Autopsy

CASE 54 Age 1 day No 3638 Manhattan Maternity Hospital July 29 1912 Condition poor Abnormality anus absent Operation colostomy (secondary) Immediate result relief remote result died in sixteen days Remarks Marasmus

CASE 55 Male age 1 day No 1160 Lying In Hospital, patient of Dr A B Davis January 9 1912 Condition jaundice Abnormality anus absent Perineal operation chloroform anesthesia Immediate result relief remote result died in sixteen days from intestinal obstruction

CASE 56 Male age 24 hours No 2953 Presbyterian Hospital patient of Dr C McWilliams Condition vomiting slight distention Abnormality anus and lower rectum absent free fluid in abdomen Operation, perineal colostomy chloroform anesthesia Immediate result relief remote result died in twelve hours Remarks Autopsy left kidney absent right kidney cystic

ATRESIA RECTI—VAGINAL OUTLET

CASE 57 Female age 9 years No 6246 Presbyterian Hospital patient of Dr McWilliams Condition good Abnormality anus absent but sphincteric fibers present Perineal operation ether anesthesia Immediate result good remote result good Remarks Control second operation to close fistula

CASE 58 Female age 19 days No 710 Babies Hospital September 28 1907 Condition fair Abnormality anus absent Perineal operation Immediate result relief remote result good No attempt to close fistula in upper part of vagina

CASE 59 Female age 1 day, No 747 Lying In Hospital patient of Dr A B Davis October 5 1908 The child weighed 5 pounds Abnormalities congenital syphilis spina bifida talipes equino Perineal operation ether anesthesia Immediate result relief remote result died in three days Remarks Marasmus

CASE 60 Female age 3 days No 28167 New York Hospital patient of Dr Markoe November 28 1904 Condition marked distention Abnormality, anus absent Perineal operation colostomy 24 hours later no anesthesia Immediate result no relief remote result died in a few hours from shock

CASE 61 Male age 2 days Lying In Hospital patient of Dr C B Knapp February 23 1907 Condition, passing urine and meconium per urethra No abnormalities Operation colostomy (secondary) Immediate result slight relief remote result died in four days from peritonitis

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NOTE—My indebtedness is due the hospital authorities and attending surgeons who have given permission for the review of their case records is also to friends who have volunteered private communications

DEPARTMENT OF TECHNIQUE

A CASE OF MEDIASTINAL THYROID REMOVED BY TRANSSTERNAL MEDIASTINOTOMY

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OPERATIONS invading the anterior mediastinum are unusual. The literature of the subject is not voluminous, a rather cursory search among the papers of recent years having yielded the bibliography appended to this contribution. Numerous papers have doubtless been overlooked, but it is believed that in this list will be found the sources of present information on the subject.

Of the various methods of approach the most attractive to me is that described by Milton in the *Lancet* in 1897, the essential point of which is the median sigmoid division of the sternum.

When for the first time in my experience the problem presented itself to me I naturally turned to this procedure which had for years been in my mind. The following case report demonstrates some of the advantages of the method and also recounts a number of interesting features both surgical and physiological.

C. M. K. W., 7 years, was admitted to Mt. Sinai Hospital on December 4, 1903. She could be located in the history had no important bearing upon the case.

For about six months there had been a swelling of the left side of the neck. The growth gradually increased in size and some difficulty in breathing arose. At times there was local pain. Four years before the first symptoms the right side of the neck began to enlarge. She never noted cardiac palpitation but stated that she had been faint sometimes.

On deglutition not painful. Physical examination showed rather normal. The mother looked her age. At the first glance the patient was not like that of a child. The thyroid gland on reviewing the case it seems possible that we were dealing with a retrosternal form of this disease. The thyroid was greatly enlarged particularly the left lobe which extended from just below the jaw to the clavicle. The eyes appeared prominent. The fundi however were normal and the lid symptoms of Basedow disease were not present. There were left ptosis, left deltoid atrophy, trismus. The left pupil considerably smaller than the right and there was some lateral proptosis. Over the right sternum there was a prominent shadow. The shadow there was enormous and deep.

A radiograph (Fig. 1) by Dr. J. H. showed a large mediastinal clearly-defined shadow which was taken to

be a pathological thyroid lobe. The garter itself was smooth and not tender but was firm in consistency. The substernal division reached to the lower border of the second rib. There were sonorous rales, especially over both lungs, most marked at the right base. Posteriorly the same was with a crepitant rale. The upper border of the heart was at the third rib, the lower border coincided with the right border of the sternum, the left border one finger breadth to the left of the midline. The circulation was strong, the rate 95 per minute and there were no murmurs.

Because of the progressive dyspnea which was certainly in part accounted for by the presence of the mediastinal growth which pushed the trachea well to the right (see Fig. 1) it was decided to attempt the extirpation of the left lobe of the thyroid and the substernal mass.

On December 6, 1903, after anesthesia I made the usual necklace incision, ligated some of the larger veins of the right side of the neck, and then attacking the left lobe of the thyroid. This was partly mobilized, and careful exploration with the finger was then made to loosen the mediastinal growth from the anterior chest wall from the mediastinal origin behind. Each time the finger was introduced there was a sharp morbid growth which eased how immediately on the withdrawal of the finger the bleeding apparently coming from ruptured pericardial vessels.

The left superior and inferior thyroid vessels were secured and the left lobe of the thyroid easily dissected out. The trachea was ligated and then ligated. No attempt was made to secure the posterior pole of the thyroid lobe.

With the left cervical tumor out of the way, nothing was made to loosen the mediastinal growth. The index finger throughout the entire dissection was carefully inserted under the tumor, appeared movable but hampered by each retraction of the mass, and caused me to desist for the time. The wound was closed by the use of gauze packs, gauze was put and the extirpation of the mediastinal tumor was deferred. The patient's temperature was 55 m.

After the operation 800 ccm. of normal salt solution were given to the patient.

Seventeen days later the patient had made good operative recovery. A part of some bronchitis was operated. This time employ the intratracheal fixation method of theriostomy. The right lobe had been removed only the day before.

This wound the neck was reopened by dissection and the left sternum to avoid the partly cut through to the space. I then attempted to free the right border of the substernal tumor with the gloved finger but the mass was so large that the finger could not reach low enough to lodge the dissection. It appeared dangerous. There



Fig. 1. Radiograph of Kie W's chest before operation. Large mediastinal shadow. Trachea displaced to the right.

fore I decided to modify Milton operation and have made an incision from the cervical wound down the median line almost to the xiphoid. I split the sternum the whole length longitudinally from the intercostal notch the section passing through the manubrium and for the intercostal spaces into the gladiolus. At the end of the longest division a transverse chisel cut was made completely through the bone. With the aid of sharp retractors the two sides of the divided sternum were separated and with the protecting finger in the mediastinum the posterior pericostal covering of the bone was divided with the scalpel from in front. Retraction was now possible for the space of at least a inch and half. Through the sternal wound the tumor was now easily located at the neck and cut away from the right lobe of the thyroid from which it was a evident outgrowth. An artery the size of large knitting needle possibly the thyroidea ima was exposed and tied between ligatures without hemorrhage.

The bleeding which considerable had not been alarm and with a traumatic saline solution of about 400 ccm the patient's condition was quite satisfactory.

On account of the impossibility of properly sterilizing the granulation wound left after the first operation I feared to close the wound without drainage. All bleeding vessels have been secured the sternal wound was once more separated and a suction was made. The motion of the lungs and heart was easily seen with the exposed pleural and pericardial membranes and the unusual sight was demonstrated to those present at the operation.

piece of gauze lightly packed in the mediastinal cavity the end emerging from the wound in the neck.

A few small omentum tubes through the skin closed the sagittal incision. On the first day the wound the neck was red the front part remaining open. This operation had consumed \$600. The report on both tumors by Dr. F. S. Mandl has a pathological diagnosis of colloid struma. The patient left the hospital the pulse of about 20 regular and strong.

Four or three hours later there was diffuse hemorrhage and also small vessel spurted in the upper part of the wound. The house surgeon Dr. Charles Koenigsberger removed some of the sutures secured the part of vessel and put in more packs.

The following day the hemoglobin was 4 per cent the blood pressure 5 and the pulse extremely rapid and irregular. A heart examination in the hospital tracings were made for me by Dr. B. Chapman, my assistant physician at the hospital. The condition of the patient was very serious and demonstrated the need for further action.

A doctor for the first time was called in. The patient was moved to the pulmonary department. The patient was given a full course of treatment with the usual doses of stramonium.

A second operation was performed the next day. The patient was moved to the pulmonary department. The patient was given a full course of treatment with the usual doses of stramonium.



Fig. Katie W. chest after operation. Trachea much lower in position; print A shadow still present; right mediastinum though the great mass is gone.

uncle itself covered only by pericardium and the tending of the heart was coincident with the relief of pressure as the gauze became saturated with discharge.

After the second operation there was a phrenic which was attributed by Dr. Emil Mayer to laryngology to complete paralysis of the left recurrent laryngeal nerve, though this structure had not been seen during the stage of the operation.

Improvement was now progressing. On removing the packing there was a large cavity with it opening to the top so that the problem of drainage was serious on mediastinal being every day a serious possible complication. Because of the unaudible exposure of the rib, natural wound some infection was certain.

An attempt to drain first made by levating the foot of the bed. This however caused dyspnea and so much discomfort that it had to be abandoned. There was some thought of filling the cavity with milder septic solution or with neutral oil but on making the test with boronolyletic solution it was found that the mere weight of so much fluid would lead to right ventricular delay healing by keeping apart the soft indurated wall of the cavity. When the patient coughed considerable quantities of the fluid were forcibly ejected.

I then determined to secure drainage by suction. For this purpose I made use of an ingenious air pump manufactured by the suggestion of Dr. Chetwood of New York. The pump was connected with the metal tank, which in turn was coupled with a red rubber apparatus, by which the

strength of the suction current could be modified. The reduced was attached to a bottle with stopcock and tube, which in turn connected with the drainage tube extending down into the patient's mediastinum. The apparatus once started by attaching it to the electric light socket the pump would continue to draw on the tank showed vacuum of many pounds. The pump then automatically ceased working. Suction reduced to a few inches of mercury or even less would continuously and silently not only empty the mediastinal cavity of fluid but also by the constant current tending to dry the part. After from twenty minutes to half an hour of lent pumping the vacuum in the metal tank would be down to about many pounds, when the pump would begin to work again until the fifteen pound vacuum was reached in the bed (see Fig. 5). In order to prevent excessive drying out of the superficial part of the wound, the dressing as applied was held in place with a tight bandage.

His next noted how coughing forced the fluid from the mediastinum. It occurred to me that blowing exercises could aid drainage and tend to fill the cavity by expanding the lungs. Twelve days after the second operation the form of therapy began to prove efficient in the evacuation of the mediastinal cavity.

About the first of February there remained only with the opening of the upper trachea not hindering the pump apparatus was discontinued. The patient was then permitted to be out of bed and his rapid gain in weight and strength. For the last day he has been



FIG 3 The tumor removed from anterior mediastinum. A port on has been removed for histological examination.

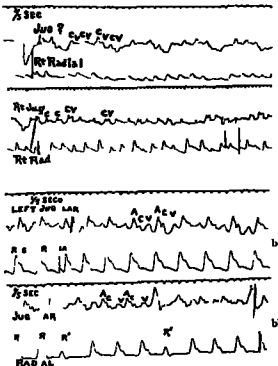


Fig 4 ECG tracings taken 1/2 sec. 0.4 sec. following operation. They show bradycardia (irregularity of the half pulse) but with a regular tracing. Jugular tracing shows regularity. The jugular tracing shows regularity and the radial shows extra beats or premature beats R.

there had been some temperature with pain in the left side and friction (sides); the lower part of the chest. Under cupping this subsided and left no sign.

My next note was made on February 28, 1904. The suprapubic wound was a mere slit granulating pink. The patient was still almost totally asphyxiated although with some effort he was able to produce a hoarse vocal sound.

She had had two severe attacks of biliary colic on February 25; local anesthesia was injected through the right upper rectus fibers, coming down upon the gall bladder. There were many tough old thoroughly organized adhesions which had to be broken down or divided. The gall bladder was then separated from the peritoneum and posterior rectus sheath and once opened it was filled with mucus. I managed to extract two stones larger than peas. The drainage was instituted.

Recovery from this operation was rapid and three weeks later the patient was discharged from the hospital apparently well.

A radiograph made some day before was but disappointing. It showed (see Fig. 3) the trachea in normal position but also a glabrous shadow moving slightly on deglutition. This location of the shadow suggested the presence of an intrathoracic lobe on the right side. This was all the more convincing because the large mass which I had extirpated had been cut away from the right lobe of the thyroid. I was therefore willing to accept the explanation of the shadow by the radiologist but confirmed by fluoroscopy under the supervision of Dr. Wesler. It must be remembered that while the view of the entire mediastinum seemed very complete my observations were



Fig. 5 Patient in bed with constant suction apparatus attached.

necessarily short considering the condition of my patient so I must conclude that there had been a posterior lobe of the thyroid gland connected with the right lobe of the thyroid body. The patient however was completely relieved and her pupils became equal and normal the ptosis was less marked.

Since her discharge from the hospital Mrs. W. has had an attack of biliary colic with jaundice and the wound in the gall bladder was open for a time. It is not improbable that a cholecystectomy may become necessary. It would have been done by me primarily but the patient desired the shortest and simplest operation for relief.

If one may venture to generalize from a single experience I should conclude that the operation of reaching the mediastinum by splitting the sternum is a simple and thoroughly surgical procedure.

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NEW TECHNIQUE FOR OPERATIONS ON STENOS DUCT

B. HUGH CROUSE, M.D., I.A.C.S., EL PASO, TEXAS

WOUNDS of the parotid gland may divide either the main duct of Steno or one or more of its chief branches. Sometimes severe blows over the cheek will also produce an occlusive inflammation of this duct. Syphilis, lupus or carcinoma producing ulcerative processes of the cheek at times destroy the salivary ducts of the parotid. In some cases such accidents or pathology lead to salivary fistulas which are always extremely annoying to the patient. The outpouring of secretion of the parotid is profuse especially at meal. Attempts to correct such fistula by surgical means have led to the development of several different methods the technique of DeGuise being the most widely known. He uses a small trocar thrusts it through the cheek from the external to the buccal surface piercing the cheek at two points over the salivary fistula and by means of the trocar a wire of lead is drawn through both punctures and tied in the mouth. Sometimes this method is successful. At other times it will fail because the saliva continues to follow the easier and older line of escape. In doing this operation one should always attempt to develop the new tract in front of the masseter muscle. The longitudinal muscular fibers of this muscle in their normal action would constrict and occlude such a channel.

Nicoladoni constructs a tubular canal of the buccal mucous membrane after having sought assiduously and successfully for the proximal end of Steno's duct. He turns the buccal mucous membrane into a tubular canal and attaches it to the dissected proximal end of Steno's duct. Where there is a deep lying fistula the result of some pathological fault in one of the larger branches of the main duct of Steno he advises extirpation of the particular lobe of the parotid drained by that branch.

Weber dilates both the fistula and the normal distal duct outlet with catgut strings or laminaria tents and then passes a seton through both sections toward the gland so as to bring the parts in line and necrose the intervening tissue. If the dilating agent can be kept in position for a few days the fistula will close by the discharge entering the mouth.

Both Eisendrath and Weth sought and secured the proximal end of the duct and drew it through the masseter muscle into the buccal surface. This technique was successful but it has the fault mentioned in discussing the DeGuise operation viz that the heavy mass of the masseter muscle has a tendency to prevent the formation of a channel the action of the muscle fibers tending to occlude the duct in its passage through the muscle substance.

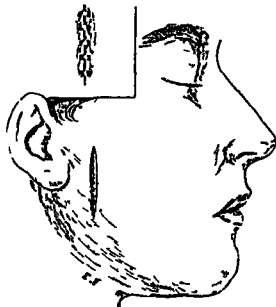


Fig. 2 Showing location of skin incision on cheek and mouth of lower lip.

In every salivary fistula of the parotid Koenig advises removal of the entire gland or ligation of its main duct with the expectation that such ligation would in time inactivate the gland which is analogous to Mayo's theory regarding results obtained upon the kidney secondary to ligation of the ureter.

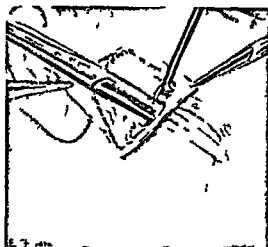


Fig. 3 Showing exposure of parotid duct and branch of facial nerve in parotid gland through skin.

The technique illustrated in this article was devised to meet the exigency of a cyst of the parotid in a young woman. The cyst at times would rupture and drain over the cheek producing a temporary fistulous tract which would close the cyst re-form and then rupture each condition being intensely annoying to the patient. The illustration of the author's technique are self-explanatory. The normal anatomical position of the parotid is shown in Fig. 3 and particularly the normal anatomical position of Steno-

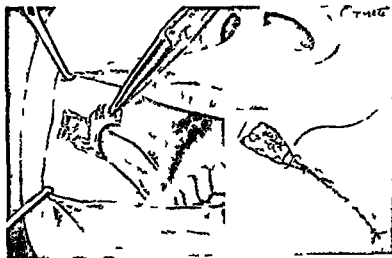


Fig. 4 Showing stripping of buccal mucous membrane and method of closure.



Fig 4 Strip of buccal mucous membrane being held by forceps and how method of entering the mouth

duct which crosses the masseter muscle 2 cm below the zygoma coming from the superior and posterior surface of the gland entering the buccal cavity opposite the second upper molar tooth. The main branches of this duct are those which lead to the cervical lobe and the pterygoid lobe of the parotid. The incision made over the cheek should start 2 cm below the zygomatic process and 2 cm in front of the ear which takes into consideration the anatomical position of the

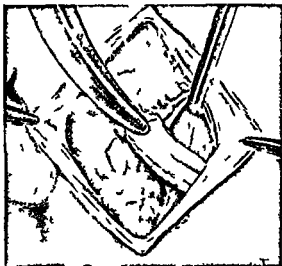


Fig 5 Strip being drawn through ready to attach to facial incision

external carotid artery and its branches—the temporal and external maxillary—as well as the location of the facial nerve and the temporal and maxillary veins as these arteries veins and nerves either pass through the substance of the parotid or beneath it. There is also a branch of the facial the auricular mentalis nerve that in contradistinction to these other structures—arteries veins and nerves—passes over the surface of the parotid just beneath the fascia of the gland just in front of the ear. The incision should be about 3 cm in length simply cutting through skin and adipose tissue of the cheek. Making the incision this length and at the point indicated will avoid all nerve arterial or venous supply or structures passing through the parotid or over it. When the fascia of the parotid is reached a 1 cm incision should be made in it as illustrated in

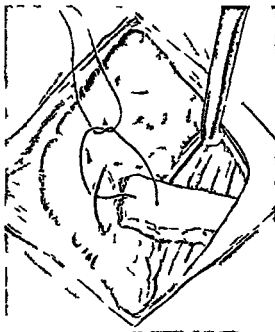


Fig 6 Suture passed same manner as in Figure 4

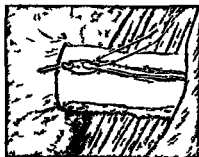


Fig 7 Five day gut being tied third part of proctoderm

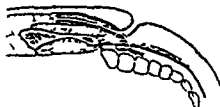


Fig. 2. Operative incision of the lower lip according to De Cursio (D. P. Keel).

Fig. 5. Next grasp the lip, turn the cheek out and mark off a strip of buccal mucous membrane one-fourth inch wide, commencing slightly within the vermilion mucous borderline of the upper lip and trace it back, lightly posterior to or even with the cusp of the second upper molar tooth, leaving the posterior end of strip thicker and of course unseparated. Make the lip end of this strip angulated, differing from illustration in Fig. 2. Clip the mucous strip with curved scissors, being careful to cut deep enough so that its vitality will not be impaired. The author makes the depth about one-eighth inch. Tag the mucous strip with an artery forceps.

Next pass a curved Doyen or similar forceps through the external cheek wound, force it over the surface of the masseter muscle, hug closely the anterior surface of the masseter, then puncture the buccinator with the forceps, entering the mouth just in front of the base of the upper lip, pierce the buccal mucous membrane and wisely stretch the forceps in order to dilate the new orifice. Insert the buccal mucous membrane strip within the bite of the forceps, pass it from the outer cheek surface (illustrated in Fig. 4), draw back the forceps to the cheek wound and suture the buccal strip into the incision of the fascia as illustrated in Fig. 6. The suture No. 5 ten-day chromic gut is similar to the Lembert intestinal suture, entering into the mucous side of the buccal mucous membrane strip. Double tie leaving the end loose in order to secure (illustrated in Fig. 7) the loop of No. 5 ten-day chromic gut



Fig. 6. Operation of the salivary fistula (B. de Cursio) method of tube of mucous membrane.

which is drawn from within the mouth by small forceps, starting from the cheek incision, the two ends of the No. 5 ten-day chromic gut remain in the mouth proper. Unfortunately the illustration shown in Fig. 6 and 7 do not give a definite idea of the channel-like appearance assumed by the strip of mucous membrane after it has been dragged through from the mouth to the fascial incision of the parotid. The illustration in Fig. 2 does not show the proper technique at the lip end of the strip, depicted as square when it should be pointed, which gives better cosmetic results in the closure of the wound and a better channel effect in its entrance into the fascial incision as shown in Fig. 6. These faults in the illustrations are due to the fact that the author did not make his point quite clear to the artist.

The author has used this technique in five different operative procedures, which ran the gamut of pathology of the parotid or Steno's duct from traumatic destruction or injury by a violent blow over the cheek, two cases, one case of salivary fistula secondary to extirpation of the parotid by another operator and the accessory parotid of *Soria palidus* having been overlooked, one case of tal wound of the cheek, which cut Steno's duct and in one case of atresia of Steno's duct, secondarily producing a salivary fistula. Each operation resulted successfully, one of which necessitated ligging the strip of mucous membrane down and incorporating it into the fascia of the cervical base of the parotid, the only portion of the gland remaining.

The author presents this technique to his professional colleagues because of the success it has given him in his surgical work.

OPERATIVE TREATMENT OF RETROVERSION OF THE UTERUS

A SIMPOSIUM¹

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THE OPERATIVE TREATMENT OF RETROVERSION OF THE UTERUS

BY JOHN G. CLARK, M.D., F.A.C.S., PHILADELPHIA

THE Philadelphia County Medical Society is particularly fortunate in having as its guests this evening the various inventors who have presented in person the details of their operations giving the most authoritative statements concerning their 1915 models from which we may take our choice or go further into the wider range of other inventors who have proposed other surgical method for correcting a retroversion of the uterus. Barrett of Chicago three or four years ago in a discussion on this same subject at Atlantic City claimed that up to that time there had been fifty two operations suggested for the correction of this malposition. Since then there has hardly been a month that has not witnessed the birth of some new operation or a modification of one of the older procedures. Even in the last number of *Surgey, Gynecology and Obstetrics* a new technique was suggested for the performance of the Gilliam type of operation. The 57 variety mark has certainly been outnumbered.

Fifteen years ago I sat at dinner by Mr. Alexander of Liverpool the pioneer in favor of the round ligament operation. A number of visiting surgeons had asked him to perform his operation while they were in Liverpool. In reply he said that he had four assistants and that he had sent them into the north, the east, the west and the south of Liverpool and after an arduous search they had returned to him with the report

that they had been unable to find one woman in that great city who had not had the Alexander operation performed upon her.

With the remarkable array of operations which has been presented in America some of the best of which have been described this evening there can be no excuse for any uterus which is the slightest bit tipped backward escaping prompt correction. I dare say that even some that are not materially tilted will be overcorrected under this technical impulse.

I am sorry that Dr. Coffey is not here this evening to describe his method for of the various procedure which I have personally tried. I have thus far found his to be the best and have practically adopted it as our standard. As I see it it possesses the advantage of getting rid of the redundant round ligament and at the same time of utilizing the relaxed anterior leaf of the broad ligament in restoring the uterus to its proper position.

We have done at least three hundred of these operations with the greatest satisfaction. It has however certain limitations. When there is considerable elongation of the uterosacral ligaments it does not suffice for although it holds the uterus in anteversion it does not prevent it from sagging into the vagina and causing some irritability of the bladder.

We have tried the Baldy Webster operation and have discarded it on the ground that the convalescence of the patient is not satisfactory in that they usually complain of considerable pain in both ovarian regions. It is possible that our technique may not have been in strict accord with that which the inventors have described but it appears to me that anatomically it possesses serious objections. In perforating the broad ligaments and dragging the round ligaments through and attaching them to the poste-

nor wall of the uterus actual pressure or cicatricial bands may form, which limit the circulation at the site of the utero-ovarian anastomosis and a local congestion may be caused. Our head nurse in the gynecological ward at The University Hospital who has followed these cases very carefully during their convalescence is outspoken in her preference for the Coffey type of operation. According to her observations one set of patients get up and go about moderately comfortably from the start whereas the others complain of pains in the ovarian regions for several days or even longer after being on their feet.

I have never been favorably disposed toward any type of operation which looks to the inguinal canal as the point of correction. I am of the same opinion as other speakers of this evening—that a simple uncomplicated retroverted uterus does not give symptoms and therefore the complaint of the patient which may be referred to this malposition is in many cases due to pathological conditions in some adjacent organ and therefore a liberal central incision is indicated and not a stab wound such as we formerly took pride in

doing which will permit a thorough investigation of conditions adjacent to the uterus and even a manual excursion into the upper abdomen to ascertain the condition of the kidneys, gall bladder and stomach.

The time has passed when the gynecologist can limit his work merely to pelvic diseases and if he makes an incision which does not permit a thorough investigation of every questionable symptom in the abdomen he does an injustice to the patient.

As to the Gilliam operation and its modifications I have performed them a few times but have always been fearful of intestinal obstruction. I do not doubt from the excellent reports of the gentlemen who have related their experiences this evening that this fear has been exaggerated. Nevertheless I cannot get away from the feeling that this operation has the same objection that any ventrosu pension or fixation method has and if some other type of operation will give as good results it is preferable. The reports of Doctors Cragin and Montgomery clear the horizon as to any marked parturient dangers, and my apprehensions may have been groundless.

HISTORY OF RETRODISPLACEMENTS OF THE UTERUS

B. HOWARD KELLY, M.D., F.A.C.S., BALTIMORE

THE history of retrodisplacements of the uterus is divided into four periods:

I. THE ANCIENTS DOWN TO ABOUT THE YEAR 1600

Prolapse was recognized but otherwise little was known of displacements which were confused with wanderings of the uterus into various other parts of the body and various imaginary conditions such as dryness, softness, distortion, compression.

2. FROM 1600 TO ABOUT 1810

During these years there was an increasingly clear recognition of the extreme danger of retroflexion of the pregnant uterus. William Hunter in 1774 reports a case treated by emptying the bladder, putting the patient in the knee-chest posture and endeavoring to replace the uterus by using the fingers of one hand in the rectum, pushing on the sac and those of the other hand in the vagina manipulating the cervix. The patient died and a post mortem showed that the womb was so tightly wedged in the pelvis that the symphysis had to be divided to get it out. During this period the method of examina-

tion was the introduction of a finger into the vagina technically called the touch. Retroflexion apart from pregnancy had to be defined as retroflexion in vacuity. The first case I find reported in this country was by Dr. Holyoke of Salem, Massachusetts in 1806.

3. FROM 1810 TO 1885

It now became increasingly evident that retrodisplacements were common. Sir James Y. Simpson felt as if he had discovered them with his uterine sound (1843). A number of works in this period were devoted to the subject among which I would mention especially that of Laroux published in 1844. This may be called the pessary period of gynecology when great reputations were made by the invention of a new pessary and when pessaries were pitched and even hawked from door to door.

4. THE LAST OR OPERATIVE PERIOD

This began in the eighties of the last century when the profession finally broke away from the domination of the pessary and brought retroflexion operations into the category of other gynecological procedures which were rapidly becoming

ing almost exclusively surgical. Since that date the pessary has occupied only a very subordinate place.

As to the frequency of retroflexions, I have found from my statistics at the Johns Hopkins Hospital that out of 13,600 gynecological cases there were 1886 of retroflexion. Of these 415 were uncomplicated. Of 1000 operations of all kinds performed there between August 27, 1904, and November 9, 1905, there were 95 cases of retroflexion.

My own original retrodisplacement operation which was done in 1885 and published¹ January, 1887, I have abandoned after doing it between 700 and 800 times on account of the occasional acci-

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dents. I now use an operation by which a single silk or linen thread on either side encircles the round ligament and draws it forward to the abdominal wall where each one is tied to the deep fascia over the rectus muscles. The peritoneum between the abdominal wall and the ligament must be picked up at every half inch in order not to leave a hole for the bowel to slip under. I have done this eighty times and believe it will prove the most satisfactory operation yet devised.

I present here a record of more than fifty different operations all designed to correct retrodisplacements — an extraordinary exhibit of the fertility of the surgical imagination. I expect to bring this collection nearly to 100.

A MODIFICATION OF THE ALEXANDER OPERATION THROUGH THE PFANNENSTIEL INCISION PERMITTING INSPECTION OF THE APPENDAGES AND THE APPENDIX AND UNITED WITH A TEMPORARY SUSPENSION OF THE UTERUS

By BARTON COOK, HIRST, M.D., F.A.C.S., PHILADELPHIA

LIKE every one who deals with female patients, particularly if one is charged with the care of women suffering from the immediate and remote pathological consequences of childbearing, I have for years been looking for the ideal method of radically curing retrodisplacement of the uterus. Although numerous methods have been given a fair trial in the last twenty-five

years including those prominently before the profession at present, it has been only in the last two years that I have felt satisfied with what I was doing.

It is not the purpose of any of the speakers this evening to criticize the methods of others, but as I understand it to give the reasons which induce them to adopt the method they employ and their experience with it.

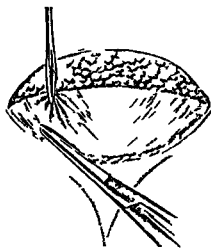


Fig. 1. Represents the Pfannenstiel incision. The most dependent point on the level of the upper edge of the symphysis.

Fig. 2. Shows the incision opened. The external os must be taken up by one blade of the forceps, the round ligament will be found.

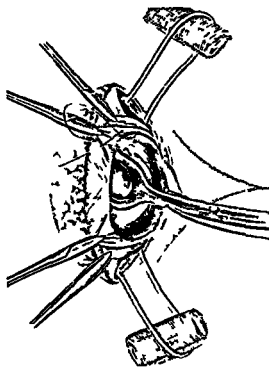


Fig. 8. Show the insertion of a single pessary to support the retroverted uterus temporarily while the retroverted uterus is being treated. The pessary is inserted into the vaginal canal. The pessary is a ring-like device with a central support.

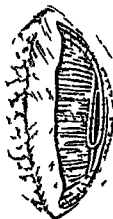


Fig. 9

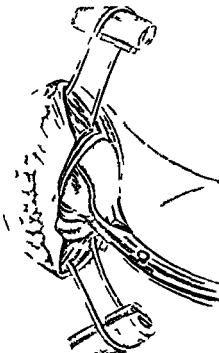


Fig. 10. Show the removal of the pessary. The pessary is pulled out of the vagina. The uterus is shown in its normal position.

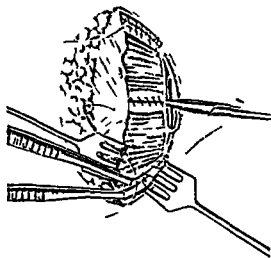


Fig. 11. Show the removal of the pessary. The pessary is pulled out of the vagina. The uterus is shown in its normal position.

In accordance with this idea I beg to submit the following. The ideal operation for retrodisplacement of the uterus must (1) restore the uterus to a natural position with normal mobility (2) must give the patient symptomatic relief (3) must be a permanent cure in spite of future pregnancies (4) must not complicate in any way a subsequent pregnancy or labor (5) must permit the recognition and correction of possible complications and (6) must not subject the patient to any subsequent risks such as strangulation of the bowels.

Does the operation advocated in this paper comply with all these requirements? (1 and 2) Shortening the round ligaments in the inguinal canals pulling them at the natural angle of traction answers the first two requirements to the satisfaction of surgeons in all parts of the world who have had sufficient experience with the operation to form a competent judgment. I know of no one anywhere who is dissatisfied with it on these two counts. (3) My personal experience with the Alexander operation extending over a period of about 20 years and embracing hundreds of cases enables me to state that I have had the smallest percentage of recurrence from this procedure of any I have tried and what strikes me as particularly important among the few failures I have had there has not been one to my knowledge following a subsequent child-

birth although some of my private patients have had as many as five children since the operation. (4) No one anywhere in the world has yet reported I believe any complication of a subsequent pregnancy or labor. (5) The one serious defect of the Alexander operation was that it did not permit the certain recognition of adhesions diseases of the tubes ovaries or appendix. The utilization of the Pfannenstiel incision obviates this defect. (6) There is no possibility of subsequent intra abdominal complications from shortening the round ligaments in the groins. It may be objected that the single suspension stitch of No. 3 chromicized gut lays the operation open to this objection and this addition to the Alexander operation might be criticized as possibly complicating future childbearing but I can say in answer to this possible criticism that in a personal experience with suspension uteri extending over a greater length of time than with any of the other operations and embracing a much larger number of cases amounting I believe to quite a thousand I have had no difficulty of this kind if the operation is done properly. My objection to it is that it never survives the next pregnancy the suspensory ligament necessarily giving way or stretching so that after delivery it gives the uterus no support. As for the detailed technique of the operation it is best described by reference to the series of illustrations.

OPERATIVE TREATMENT OF RETROVERSION OF THE UTERUS

By EDWIN B. CRIGIN, M.D., NEW YORK
Professor of Obstetrics and Gynecology, Columbia University

IMRESSED with the number of recurrences of retroversion following the Alexander operation in the hands of different operators and still further impressed with the dystocia requiring cesarean section for delivery after the operation of ventrofixation and even after ventrosuspension in the month of June 1905 the writer turned to the principle of the Gilliam operation with the feeling of great hope. The principle of the operation which appealed to me was that of shortening the round ligament on each side by drawing a fold of it through the rectus muscle. After performing two or three of these operations through a median incision I became convinced that the Pfannenstiel incision was preferable for this work for several reasons among which were the simplicity of the technique, the safety of the cicatrix and the cosmetic result. Since June 1905 my operations have been performed through a Pfannenstiel

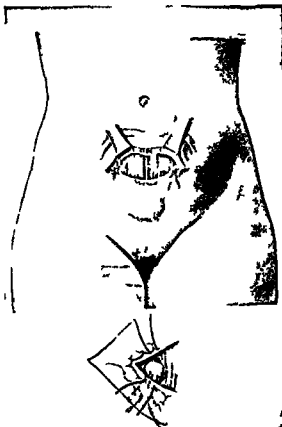
incision. Until November of that year it was my custom to draw the loop of round ligament up through the incision in the fascia so that the top of the loop would be above the level of the fascia when it was sutured. In that month in one of my private cases the loop of round ligament on one side sloughed letting one horn of the uterus fall backward a little. It did not interfere with the symptomatic result but the anatomical result was not perfect and did not satisfy me. On studying the problem it seemed to me that the ligament sloughed because it was constricted by the fascia and since November 1905 I have been careful to perform the operation in such a manner that the loop of round ligament when sutured lies just beneath the fascia and does not perforate it. Since that date I have had no further trouble with sloughing of the ligament and my technique has been as shown in the illustration.

A semilunar incision is made just below the upper border of the pubic hair so that the cicatrix will be concealed by it. This incision includes skin, fat and fascia. The recti are separated and the peritoneum opened longitudinally. A traction thread of catgut is passed under each round ligament and this traction thread on one side is seized by a sharp-pointed artery clamp which is passed through the rectus muscle at the outer angle of the incision through the fascia. This clamp with its traction thread and loop of round ligament is then pulled through the rectus and the loop of ligament is sutured just beneath the outer angle of the fascial incision with two chromic catgut sutures which at the same time close the outer angle of the fascial incision. When the artery clamp is pushed through the rectus great care is taken to pull the peritoneum well toward the median line so that the opening in the peritoneum will be just under the opening in the rectus; otherwise when the loop of round ligament is pulled through the rectus it may retract the peritoneum from the inner edge of the rectus and leave part of the muscle without peritoneal covering. When the loop of ligament is pulled through the rectus if the muscular fibers separate any more widely than just sufficient to allow of the passage of the round ligament loop this extra opening should be closed with catgut. The same technique is followed on the opposite side the peritoneum is closed longitudinally with a continuous plain catgut suture and the recti are approximated with a few interrupted sutures of the same material. The incisions through fascia, fat and skin are now closed the fascia being sutured with chromic catgut, the fat and skin with plain catgut, the suture of the skin being subcuticular.

Before any operation for retroversion of the uterus can be called satisfactory it must conform to the following criteria:

It must be safe it must be permanent in its result it must not interfere with pregnancy, parturition or the puerperium.

During the nine years ending in June 1914 the writer has performed with the help of his assistants four hundred operations according to the technique just described. Of these four hundred operations one hundred and fifty were upon private patients, two hundred and fifty upon ward patients—287 were performed by the writer himself, 113 by his assistants. During the past six months we have performed with four additional operations of this kind but these are considered too recent to be included in this discussion. The writer is now prepared to



Gill operation through Pfannenstiel incision

subject his series of four hundred operations to the criteria mentioned above.

It is hardly necessary to mention the difficulty in following operative cases after they leave the hospital. During the past two months in answer to a questionnaire I have heard from 164 of the four hundred cases and 113 of them have been examined by my assistants or myself. The first test to be applied to these four hundred operations is that of safety.

I regret to be obliged to report that I lost one of the cases in this series. It was a frail woman whose left tube was badly diseased and so firmly adherent to the rectum that in freeing it I damaged the rectal wall and so lowered its vitality that colon bacilli gained entrance to the peritoneum and she died of a colon bacillus infection. Strictly speaking this should not reflect upon the Gilliam operation as the trouble was caused in the early part of the operation before the work on the round ligament had started. It was a complicated case in which

nothing but an intra abdominal operation would have met the indications and whatever the intra abdominal operation the result would probably have been the same

This series comprises all the cases in which it was considered desirable to hold the uterus in place by shortening the round ligaments except cases of prolapse beyond that of the first degree. These are not included in this discussion although in certain cases of marked prolapse in addition to other operations the round ligaments were occasionally shortened by this method.

This series then includes many operations on complications aside from the mere correction of a retroversion. For purposes of study the cases were divided into *simple cases* and *complicated cases*. I can if the patient did require a plastic operation on the pelvic floor or the cervix or both he was placed in the group of simple cases. Moreover if in the course of the operation it seemed wise to remove the appendix either from pathological indications or at the patient's request the case was still regarded as simple. The complicated cases were made to include those involving operations on the ovaries or tubes and myomectomies.

In this series of four hundred operations there were 12 complicated cases. 86 had operations performed on ovaries or tubes, 45 had one or more myomectomies performed. In a series of four hundred such operation where 127 were complicated cases according to the definition given above it does not seem to me that the loss of one complicated case should put the operation outside of the realm of safety. This was the only death in the four hundred operations. The appendix was removed in 37 instances and in 37 private cases. To some this may seem a high percentage of appendectomy to perform in the course of an operation begun for another limitation purpose, but in the series and discussion in which those from whom the appendix was not removed at the time of the operation for retroversion I have been obliged to submit to a subsequent operation on account of an acute appendicitis. Two of these operations were performed by myself and two by other surgeon. One of these (the two who provoked that I had not removed her appendix at the first operation that she would not allow me to do it when the acute attack came. Another in answering my questionnaire wrote as follows: "I can do anything now and have no nerves. I can play thirty six holes of golf and hardly feel tired. I have only one regret—that you did not remove my appendix. Such experiences as these have led me to remove the

appendix in quite a large proportion of cases when operating for retroversion.

The second criterion to which the writer would subject this series of operations is that of *permanence in result*. In order to ascertain the present result of these four hundred operations a postal card was sent to the two hundred fifty ward cases asking them to come to the hospital. Seventy-eight came and were examined. To my one hundred fifty private cases the following questionnaire was sent:

Have you been much benefited by the operation?
What are your symptoms before operation?
What symptoms have you had since operation?
Are you in good health now?

To the married women among this series the following question was added:

If you been pregnant after the operation. What has the result been?

This questionnaire was answered by 86 of my private patients and at my request 35 of them came to my office and were examined. By this means 164 cases out of the four hundred were heard from and 113 of them were examined either by myself or my assistants within the past two months. Of the 113 examined 111 showed the uterus in perfect anatomical position. In two the uterus lay in the axis of the vagina. In one of the two a myomectomy was done at the original operation. In the five and one-half years which have elapsed since fibroids have grown until now the uterus with its tumors, about the size of one fist. This extra weight proved to be too much for the shortened round ligament to support although the patient is now free from pelvic symptoms. In the other of these two cases although the uterus lies in the axis of the vagina it cannot be put into position for retroversion and the patient is practically free from pelvic symptoms.

Among the remaining fifty-one cases heard from but not examined by me, my assistant has to report two recurrence of the retroversion. One of these recurrent cases was operated upon March 26, 1912, a myomectomy being performed as well as a shortening of the round ligaments. In November of that year he was examined by me and the uterus found in good anatomical position although he complained of some symptoms of prolapse. In January 1914 he was examined by another gynecologist who reported that he found the uterus slightly enlarged, retroverted and freely movable with a pronounced cystocele and a relaxed posterior

vaginal wall. In February 1914 he performed an anterior and posterior colporrhaphy with ventrofixation. He reports that in November 1914 the anatomical result was perfect but that the patient still had a sensation of prolapse at times. The second case in which a recurrence of the retroversion was reported by another physician was one with extensive adhesions of omentum bladder appendix and appendages. Her physician now reports to me as follows: She has a slight retroversion of the uterus with a few adhesions posteriorly; uterus is slightly fixed. Her discomfort and symptoms are relieved by a tampon once or twice a month. In addition to these two partial and two complete anatomical failures among the 164 patients heard from there were two other cases in neurotic women who reported that their symptoms were not relieved by the operation. To sum up the results in these 164 patients heard from and calling a uterus which lies in the axis of the vagina a partial anatomical failure we have

- 3 partial anatomical failures
- complete anatomical failures
- symptomatic failures although anatomical successes

If the same proportion of failures occurred in the 236 patients not heard from as in the 164 heard from we would have in the complete series of four hundred operations according to this method

- 5 partial anatomical failures
- 3 complete anatomical failures
- 5 symptomatic failures although anatomical successes

These results subjected to the criterion of permanency are better than the writer has been able to obtain by any other operation justifiable in the child bearing age.

The last criterion is that of maternity. Does this operation cause discomfort during pregnancy? Does it favor miscarriage? Does it interfere with parturition or the puerperium? The results in the 164 cases heard from would seem to answer these questions in the negative.

Discomfort. Of these 164 cases heard from pregnancy has occurred in 35 and in none of them have I been able to ascertain that the discomforts were more than usual in pregnancy or that any had discomforts which could be directly ascribed to the operation.

Miscarriage. Of the 35 who became pregnant after the operation 22 went to term and bore living children; one has had two living children since the operation. Nine are now in the course of pregnancy; 4 have had miscarriages induced or

natural. Of these 4 one has had 7 induced abortions since my operation; one has had 2 induced abortions. One miscarried after a fall; one had a miscarriage without assignable cause but she had had one living child before this miscarriage and since my operation and is now advanced about 4 months in her third pregnancy. This gives one miscarriage after a fall and one miscarriage without assignable cause in 38 pregnancies, which does not seem to the writer a greater frequency than one would expect in women not operated upon. Furthermore it may be stated that one of these patients did not menstruate after leaving the hospital becoming pregnant at once. Another menstruated only once before becoming pregnant.

Dystocia. In none of these 22 cases who went to term once or more have I been able to get any history of dystocia. In one of these cases although she lived only four blocks from my office and I started at once when the nurse called me at the beginning of the second stage the baby arrived before me and this in spite of the fact that this was the woman's first pregnancy. The nurse said that the patient had only four pains in her second stage.

Puerperium. In the cases seen by the writer and in the reports received from other physicians attending these cases the puerperium including the involution of the uterus has been normal. One writes as follows: The uterus has remained in good position; no birth complications; involution prompt and complete.

It may be stated here that as far as we have been able to ascertain the uterus has continued in normal position after all the pregnancies in this series.

The question naturally arises: Does a hernia through the rectus ever occur as a result of making an opening for the loop of round ligament? The writer has seen two cases operated upon by other surgeons, in which a small omental hernia had found its way through the opening in the rectus alongside of the loop of round ligament. The absence of hernia in any of the cases heard from in this series of four hundred gives ground for hope that the care in leaving the opening in the rectus just large enough for the round ligament loop makes the occurrence of hernia at least very improbable.

In conclusion the writer would like to record his thanks to Dr. William L. Miles of the Sloane Hospital staff for his great assistance in following up cases and obtaining statistics.

Since the reading of his paper these additional cases have been delivered without dystocia.

THE SURGICAL TREATMENT OF RETROVERSION OF THE UTERUS WITH SPECIAL REFERENCE TO THE LOWER POLE

By J. WILSON BOVEL, M.D., JACOB WASHINGTON, DISTRICT OF COLUMBIA

THAT retroversion of the uterus has been so persistently regarded as a medical or surgical entity is to be deplored. In reality it is no more than a symptom or complication discovered alone by accident and then when investigation is made for a condition having a true symptomatology. Hence it is only a complication but one requiring rectification. I am convinced that uncomplicated uterine retroversion has no symptoms. In those cases in which surgical intervention is clearly indicated it becomes necessary to select that one of those operations of the very many that seems best for each individual. No operation can possibly be indicated in more than a small percentage of cases of retroversion of the uterus.

To select intelligently the proper one or ones it becomes necessary to understand the forces or mechanism by which the uterus is maintained in what may be called its normal position in the pelvis. These forces are commonly listed as intra-abdominal pressure, the uterine supports or ligaments, and the vaginal walls.

INTRA-ABDOMINAL PRESSURE

I know the influence of intra-abdominal pressure as the only or the principal force acting in this capacity has many strong supporters whose opinion on other subjects in gynecology commands our attention. But that retroversion or procidentia of the uterus occurring in the very obese woman with tense abdominal walls or in the very thin one whose abdominal walls are markedly relaxed is due alike to positive (or the absence of negative) intra-abdominal pressure I cannot believe. And if in both of these instances proper surgical operations are performed upon the vaginal walls or uterine ligament or uterine structures, or combinations of these and permanent success results which is usual the importance of intra-abdominal pressure in this connection must be excluded.

Again we often find such result from that cause absent. Even extreme distention from ascites may fail to displace the uterus materially. I have therefore concluded that intra-abdominal pressure plays a very insignificant part in the maintenance of the normal position of the uterus and less in prevention of retroversion.

THE VAGINAL WALLS

It is generally conceded and I agree that the normal posterior vaginal wall closely apposed to

the anterior one receives the downward impulses of the latter and the uterus which result from rhythmic (respiration) or arrhythmic increase of the positive intra-abdominal pressure and it is further believed that this resistance is an important factor in maintaining the normal uterine position. I believe it is an important adjunct to the action of the uterine ligaments, and only that. Retroversion of the uterus and a normal posterior vaginal wall commonly are noticed coincidentally.

Women also have normally placed uteri and complete laceration of the perineum for twenty years duration. Nevertheless proper surgical treatment of uterine retroversion should not include negligence of rectocele or laceration of the perineum.

THE UTERINE LIGAMENTS AND SUPPORTS

I believe its ligaments and the vaginal walls attached to it are the all important factors in maintaining the normal position of the uterus.

In analyzing the subject of uterine ligaments it is noted first that the longitudinal axis of the uterus, in the pelvis and practically perpendicular to that of the human body, second that the lower pole has ligaments (the round) attached to it in front only, third that the lower pole has ligament attached both in front and behind which are much less elastic and contractile than are the round ones, and fourth that attached to either side along that part of it axis that lies between the attachments of the ligaments of the two poles is a broad ligament. The two broad ligaments are much more powerful than are any other pair of uterine ligaments and I believe are most influential in preventing sagging of the uterus.

Between the round and uterosacral ligaments encroached between the uterine body and the anterior wall of the pelvis and abdomen is the bladder which is constantly pushing or pulling the uterine body. Since in retroversion the cervix is displaced forward as well as the fundus backward we may assume that the uterus has a transverse axis at some point. The cervix is never back in the hollow of the sacrum in retroversion of the uterus except when some traction or propelling force is effective on both poles of the organ. The position in the pelvis in which the cervix is held by the opposing action of the uterosacral and uterosacral ligaments has all

to do with the proper nearness of the lower uterine pole to the hollow of the sacrum

The uterosacral and utero-vesical ligaments are antagonistic in their action upon the lower uterine pole and yet acting together form a very important sling like support to the uterus and bladder. When the pull of the utero-vesicals overcomes that of the uterosacral anterior displacement of the cervix and posterior displacement of the fundus directly result. If I am correct in regarding the function of the round ligaments as solely to pull the upper uterine pole forward as the contents of the bladder is being expelled then normally its efficiency as an anterior support may well be discredited.

Just how much influence is exerted antero-posteriorly by the broad ligaments upon the uterine axis I have not concluded but shall consider it further in the pathology and faulty development of the uterine ligaments. With this prologue discussion may be entered as to the conditions that may have retroversion as a result. I will not consider such known ones as deep lacerations elongation or hypertrophy (from any cause) of the cervix the presence of neoplasms or subinvolution in the uterus or pelvic adhesions resulting from infection. All are agreed such conditions demand proper treatment. With this elimination I am practically confined to consideration of defective ligamentation of the uterus.

The anterior traction on the cervix may be greater than the posterior as a result of abnormal development or from traumatism. The latter is usually the result of parturition and may be from extreme stretching or from rupture of the uterosacral. Ofttimes they are found torn from the sacrum.

The abnormal development may be in either the utero-vesicals or the utero-sacral or both. In the utero-vesicals it is deficient length or attachment too low on the cervix or both. The utero-sacral may be too long or attached too high to the uterus or both. Again both sets of these ligament may be so relaxed as to allow sagging of the uterus to such a degree that its long axis follows the pelvic axis and the organ is retroverted. It is believed the broad ligaments may be attached to the uterus too far back at the lower pole pulling it unduly forward or to the upper pole so far forward as to allow it to assume a position too far back.

In my opinion it hardly seems proper to rely entirely upon shortening the round ligaments as a remedy for retroversion of the uterus. I believe that success will attend this procedure only

when a strong ligament exists or is made so by plicating it and by markedly shortening it and thereby limiting its function of permitting the fundus to be safely pushed far back by the distended bladder. In many patients in which the displacement has been thus overpowered suffering supervenes not unlike that following the once popular ventrosuspension of the uterus. And again with the upper pole of the uterus being pulled forward above the bladder by the shortened round ligaments and the lower pole pulled in the same direction below it the latter of the two influences now opposed to each other should ordinarily be the victorious one though a compromise antelevation is possible when both sets are very strong.

While in the contention regarding methods of shortening the round ligaments it has been asserted repeatedly that the intracanalicular part of those ligaments is weaker than the subperitoneal part no facts have been offered or experiments made to prove it which in turn leaves us in doubt. I am convinced that in many cases these ligaments will be found to be so small and feeble that triplication with suturing the folds to the inguinal ring and to the uterus as well as to each other will be absolutely necessary. In such cases all other plans for shortening them will be at least failures. In a fair percentage of cases in which the appendages have been removed and the uterus retained the round ligaments may be looped over the stumps and sutured to the posterior surface of the uterine body thus serving the double purpose of covering in raw surfaces and increasing the ligamentary leverage.

As an adjunct to the proper treatment of the ligaments at the lower uterine pole shortening the round ligaments is of great value even if the effect be evanescent. While I have shortened the round ligaments by many of the methods advocated I generally combine it with correctional work upon the lower sets of ligaments. Yet in the so-called Webster-Baldy operation I find a special indication when prolapsed and enlarged or hyperplastic ovaries demand surgical treatment. I have found this operation to be very much more satisfactory than any other in such conditions particularly when no special ligaments are faulty but rather a general relaxation of all of them is present. Ventrosuspension and round ligament shortening for retroversion of the uterus owe their past popularity to their easy performance.

Along these lines I read a paper¹ February 9 1898 and in a symposium² on retrodisplacement

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By J. WESLEY HOWE, M.D., I.A.C.S. WASHINGTON, DISTRICT OF COLUMBIA

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What I especially desire to accentuate in this paper is the simplicity, safety, and efficiency of the original operation and its freedom from unpleasant sequelæ. As I have made several changes in the technique from time to time and as I am continually receiving letters of inquiry relative thereto, I append a description of the operation as I do it today.

OPERATION

1. An abdominal incision three or four inches in length is made in the median line at the usual site between the umbilicus and pubes.

2. The adhesions are broken up and the fundus brought forward.

3. By lifting up the broad ligament of one side on the tip of a finger applied to the posterior surface, the round ligament is brought into view and is picked up by a bullet forceps.

4. Selecting a point an inch and a half from the uterus, a thread is passed under the round ligament and the end of the thread are brought out of the opening and secured in the bite of clamp forceps which is laid on the surface of the abdomen.

5. The other ligament is sought for and secured in the same manner.

6. At a point about one inch and a half above the pubes, the peritoneum, muscle, and fascia are caught up by a volsellum and pinned together, being careful that the edges of these layers are approximately in line.

7. Fraction is now made and with a claw retractor the skin and superficial fat are drawn in the opposite direction and by a sweep of the knife the face of the fascia is laid bare.

8. With a Cleveland ligature carrier or some similar instrument a stab wound is made from the surface of the fascia into the peritoneal cavity, one inch from the edge of the abdominal incision. The jaws are separated and by an outward movement of the handle brought into *plum* view at the large opening. The thread which loops the round ligament is now placed in the jaw, the clamp forceps removed and the ligature carrier withdrawn, bringing with it the thread and the ligament.

Now while the ligament is held taut with its loop-end just above the surface of the fascia, a catgut suture is passed through it including the tissues on either side, then back again where it is tied. This is cut close to the knot and the suspending thread removed preferably by clipping it close to where it passes under the ligament to avoid possible contamination.

10. The volsellum and retractor being removed, the other side is dealt with in like manner and the incision closed.

After both ligaments have been fastened, it will be observed that an opening exists between the uterus and abdominal wall of from seven to nine inches in circumference and that the two openings on the distal side of the loops will readily admit two and sometimes three fingers and are soft, yielding, and distensible—conditions under which strangulation of the bowel would hardly be conceivable. It will be observed that the uterus is not suspended but rests easily and naturally on the bladder from which it can be raised to a position little short of the vertical. Thus the uterus is enabled to conform to the altered conditions of the bladder and rectum and to the various bodily movements. Should pregnancy ensue, the ligaments develop *pari passu* with the growth of the uterus and there is neither embarrassment in gestation nor difficulty in parturition.

To the various objections that have been urged against this operation, I will merely say that practical results always outweigh theoretical deductions. For fifteen years it has stood the test of time and numbers and none of the evils which were predicted for it have come to pass. So far as I know, there has not been a single instance in which pregnancy or parturition have been embarrassed by reason of it; there has not been a single instance of incarceration or strangulation of the bowel; there have been no untoward results in any shape or form, but on the contrary, the results have been uniformly pleasant and satisfactory. True, I have read of a few isolated cases in which it was averred that intestinal obstruction ensued and one can readily see how an intestinal obstruction might occur in this as in any other intraperitoneal operation as the result of a plastic exudate from preexisting pathological conditions or from raw surfaces the result of breaking up adhesions. But such conditions are common to all operations within the peritoneal cavity and should not be credited to the operation *per se*. Even granting that a case now and then out of tens of thousands does go wrong, such could by no possibility counterbalance the enormous advantages accruing from quick work, absence of mutilation and the various ills and mortality attendant on more extensive operations.

Aside from the reasons already adduced for the absence of intestinal obstruction in connection with this operation, there is one which has not received the attention it deserves and that is

ments of the uterus in the American Gynecological Society in May 1902. I reported my work on the uterosacral from the beginning June 29 1897 to 1902. Further reports were read the last being in 1906 when 129 cases were reported. A considerable number of case histories of operations since then are inaccessible and I can not therefore give a complete résumé to date of my operations on the lower uterine ligament for retroversion.

In my earlier work I did about half of the operations on the uterosacral uterosacral and round ligaments by the vaginal route. Uterosacral ligament faults in childbearing women were so commonly a marked itching requiring triplication or were injured so near to or quite at the sacral end as to be inaccessible by the vaginal route that I adopted the abdominal route solely for reaching these ligaments in the woman who had parturition as an etiological factor. In the virgin or the woman with a very narrow vagina these ligaments were also inaccessible from the intravaginal route and here again I adopted the suprapubic rather than resort to paravaginal incision for widening the vaginal lumen. By the vaginal route the anterior vaginal wall may be surgically treated either lengthen it by the plan of Schuchking⁹ or by transplanting to a higher point on the cervix the uterosacral ligaments or both. Moreover pelvic adhesions may be pulling the uterus backward and not recognized before the abdomen is opened for reaching another reason for selecting the abdominal route. This seems to narrow the field for the vaginal route to the nullipara having a large vagina at least for those requiring urgent

procedures on the uterosacral and lower portion of the broad ligament.

In these Jellett's operation or other surgical treatment of the uterosacral or backward transplantation of the bases of the broad ligament or treatment of the anterior vaginal wall *secundum altem* or any combination of these with or without round ligament operation may be performed. I believe Jellett's operation is distinctly superior to retroversion shortening of the uterosacral in this class.

I found a valuable aid in treating the lower pole defects to be forward transplantation or looping of the base of the broad ligaments. This may be done without entering the peritoneum which of course lessens the danger of adhesion.

I may briefly express my views as follows:
1. Round ligament shortening *per se* does not usually contain all required elements in the treatment of retroversion of the uterus though it may end the displacement.

That no single operation devised is more successful than it is.

2. That the displacement is more certainly influenced by the ligation at the lower pole than by other forces and therefore the proper adjustment of these forces is of paramount importance.

3. That with intelligent reflection for any particular operation the exact cause or causes of the displacement must be sought and the operation or operations thus indicated performed.

4. That the vaginal route alone is not applicable except in the roomy vagina of the nullipara or when the operation is limited to the anterior vaginal wall and possibly broad ligament base.

5. That round ligament shortening is often advisable as an adjunct to operations on the ligaments at the lower pole of the uterus.

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Verhandl. d. Gynäkol. deutsch. Nat. v. u. Verein. Leipzig, 1906, 1, 11.

THE GILLIAM OPERATION FOR DEFLECTIONS OF THE UTERUS

BY DR. TOD GILLIAM, M.D., CLEVELAND, OHIO

I REGRET the necessity of using my own name to designate this operation but as it has become known as such and as there are many modifications of round ligament suspension I am left no alternative.

As most of you are aware this is the pioneer ventrosuspension of the uterus by means of the round ligaments in which the ligaments are left intact in their natural investments.

I am gratified to find that the operation has grown in favor as time goes on and that it is now

being used by many of the best gynecologists and general surgeons in this and foreign lands. The fact that there have been a number of modifications of the original operation serves to emphasize the strong probability that the principle is right and that round ligament ventrosuspension in one form or other has come to stay. Of these modifications all of which are excellent I shall not speak as they are each and all supported by men of ability who are able to take care of their own

of their length and curved direction though they undoubtedly tend to restrain the fundus from an undue range of movement backward.

In endeavoring to carry out the principles above enumerated I have long since abandoned all operative procedures carried out through a vaginal incision such as shortening of the round or uterosacral ligaments vaginal or vesical fixation. I have also given up all procedures carried out by the abdominal route which result in the slinging of the uterus from the abdominal wall by an artificial band or in the pulling of the fundus toward the parietes by the shortening of the round ligaments.

My aim is to correct the displacement by repairing the damaged soft parts of the pelvis in such a manner as to restore the normal anatomical relationship of the uterus and to subject the latter to the normal influence of intra-abdominal pressure.

In the first place a damaged pelvic floor must always be repaired. Too often is this neglected by operators especially by those whose experience in pelvic surgery is limited. The largest percentage of success in pelvic operative work will be found in the practice of those who give most attention to the strengthening of the floor of the pelvis after it has been torn or stretched. Chronic infective conditions in the uterus may demand surgical treatment e.g. curettage amputation of the cervix. When the uterus is markedly hypertrophied the latter operation may require to be extreme. The abdomen should next be opened by the suprapubic mesial incision. The course of procedure is then determined by the conditions which exist. In a typical well marked case of retrodisplacement without important complications, where the uterosacral ligaments are much stretched or obliterated I first carry out what is generally termed shortening of the uterosacral ligaments but what is really a making of new ligaments out of the parietal peritoneum and subjacent tissue. These tend to hold the cervix in its normal position, the long axis being directed backward and downward. I always use linen sutures in making these ligaments in order to insure a more certain development of fibrous tissue than will follow the use of catgut and therefore greater permanency.

I then cause the fundus of the uterus to be directed forward to the pubes in its normal position by shortening the round ligaments and stitching them securely to the upper part of the posterior surface of the uterus. This procedure was first described by me in a brief communication published in the *Journal of the American Medical*

Association October 5 1901. The technical details as practiced by me at the present time are as follows:

1 The broad ligament is perforated with a curved forceps immediately under the utero-ovarian ligament close to the uterus care being taken to avoid injuring a vein.

2 Emerging just above or behind the round ligament an inch or more (according to the length of the stretched ligament) from its uterine end the forceps grasps the ligament and pulls it through the opening doubling it on the back of the uterus. This bent portion is spread out as widely as possible the smooth peritoneal surface being uppermost (superficial). The under surface is then stitched to the uterus with linen suture. The latter is completely buried under the ligament the edges of which are stitched to the uterus with catgut. The other round ligament is then similarly dealt with. Variations are obtained in carrying out these details. Sometimes the doubled round ligaments overlap on the posterior surface of the uterus. Sometimes they lie close together. In other cases there is some space between them. The level of attachment is opposite the lower margin of the inner ends of the utero-ovarian ligaments.

3 The next stage is important viz to close the openings in the broad ligaments stitching their edges to the round ligaments so that no raw surface is left and no chance for the development of a hernia.

4 When the uterus is very large and heavy or the level of the utero-ovarian ligament abnormally low or the outer ends of the round ligaments much thinned I stitch the round ligaments with linen to the edge of the uterus immediately in front of and above the opening made in the broad ligament. It is important to note that the broad ligaments are perforated below and not above the utero-ovarian ligaments that they are stitched to the uterus with linen or silk and not with catgut that their smooth peritoneal surfaces are made to lie superficially so as to lessen the risk of adhesions.

When the operation is accompanied by the removal of a tube or tube and ovary on one side the round ligament is shortened on this side by doubling it back directly without perforating the broad ligament care being taken to cover all raw surfaces. In the case of bilateral removal this procedure is carried out on both sides.

The result of this technique is to place the uterus in a natural position the cervix being directed downward and backward the fundus upward and forward. The pelvic floor being

the intestines keep out of the danger zone. Years ago when everybody was studying frozen sections it was discovered that intestines were never found occupying the vesico uterine space in front of the uterus. So it will be seen taking it all in all that the chances of intestinal obstruction in this operation will be reduced to the minimum.

The facility with which the operation can be done its trivial character and the almost complete absence of all that tends to lower vital resistance make it especially valuable in combined operations and in operations of special gravity.

Failures. The failures so far as my personal knowledge goes have been very few. In my earlier experience I had one case of a curled up uterus far back in the hollow of the sacrum which tore away from its moorings. Such cases are associated with a preternaturally short vagina and are not amenable to any form of treatment. I have also had a few failures by attempting to use greatly attenuated ligaments but inasmuch as there is no way of determining the condition of the ligaments before section and as in many cases a very slight restraint will prevent the backward displacement of the uterus such cases cannot always be ascribed to error of judgment. The majority of failures are due to one easily preventable cause namely the insecure attachment to the abdominal walls. It is essential that the suture which holds the ligament in

place should pass through it as well as the tissues on either side of it. Now it frequently happens that the ligament where it passes through the puncture wound is very much constricted whereas the exposed portion of the loop is turgid and swollen so that taking this as a guide the needle will occasionally go to one side or the other of the constricted portion of the ligament. The result is, that within a very short time probably within a few minutes the ligament pulls away. To obviate this after introducing the needle and before drawing it through relax the thread which is holding the ligament up and note whether the loop recedes and then if not satisfied make traction on the ligament from within.

Since adopting this precaution I have had no failures that I am aware of.

In my earlier work I was much discouraged to find that in a large proportion of cases after confinement the uterus settled back in the pelvis. Examination of such cases months later and after the uterus and round ligaments had under gone involution revealed the uterus in place just as it had been before the occurrence of pregnancy.

In case of subinvolution this restoration to the normal may be long delayed or even prevented entirely.

In conclusion I wish to reiterate that the operation is simple safe and efficient and because it is so simple safe and efficient it has won its way around the world.

PRINCIPLES AND PRACTICE IN THE SURGICAL TREATMENT OF RETRODISPLACEMENTS OF THE UTERUS

By J. CLARENCE WEBSTER, M.D., F.A.C.S., CHICAGO

I DESIRE to describe as briefly as possible the practice which I have gradually developed in the course of years in the surgical treatment of retrodisplacement of the uterus. In endeavoring to establish a scientific procedure I have aimed to carry out certain principles.

1. The operation should restore the soft parts of the pelvis as nearly as possible to the normal condition.

2. In the childbearing period, the operation should not introduce any factor which interferes with the safety of pregnancy and labor.

3. It should also be of such a character as to make it possible for the woman to bear children with the reasonable hope that there shall be no recurrence of the displacement.

4. The operation must be carried out so as to make thorough exploration of the pelvic

cavity possible so that all associated pathologic conditions may be dealt with. The technique employed must not cause such trauma as will give rise to after trouble.

I have kept before me the following anatomical facts regarding the uterus. The cervix is more fixed than the body being slung in a suspensory structure formed by the uterosacral ligaments, the bases of the broad ligaments, the fascial and other attachments of the bladder and vagina. The body has a considerable range of movement owing to the laxity of its connections. In the great majority of instances the organ is developed with a tendency to anteversion and anteversion intra-abdominal pressure being the chief factor which tends to continue this relationship. The round ligaments normally exercise little influence in keeping the uterus in this position, on account

The many procedures originated and practised make it evident that there is no procedure that is applicable to every case but that the procedure or combination of procedures must be adapted to the particular conditions confronting the operator in the particular patient before him. The fixation and suspension operations soon demonstrated their disadvantages in their more or less marked obstructive influence upon the progress of subsequent gestation and parturition. The ideal result in this procedure was to secure a peritoneal cord or fold which would maintain the non-pregnant organ forward and not interfere with the processes of evolution incident to pregnancy. It was not always possible to control the process of wound repair to such an extent as to ensure the limitations of such a suspensory band and when such repair was secured to feel confident that it would serve any purpose of support when the processes of involution had restored the uterus to its normal size subsequent to parturition. No procedure could be considered satisfactory which gave promise of enduring only until the next child bearing nor was it conducive to the encouragement of reproduction. Fixation was a source of danger in that it did not permit of the uniform development of the uterus in gestation but promoted the enlargement at the expense of the posterior wall greatly endangering the occurrence of rupture during labor or obstruction to delivery by the undilated and resisting anterior wall. In many cases delivery by abdominal section or the sacrifice of the offspring became alternatives. Even should the woman fail to become pregnant the artificial band between the uterus and parietes was occasionally a source of danger. Intestines and omentum have become adherent about such band and have led even to strangulation or obstruction. The artificial character of the support the uncertainty of its duration and the possibility of complications naturally led to the consideration of additional alternative procedures.

With the abdomen opened the round ligament became the recipient of far more attention. It was folded inward and outward doubled on itself attached to a freshened surface upon the anterior surface of the uterus a loop of each ligament carried through a triple opening in the anterior uterine wall the ligament cut at its uterine end carried through the broad ligament and fastened behind the uterus. This step was later modified by carrying through a loop of the uncut ligament. However all these procedures had the common objection that the best part of the ligament was utilized producing increased

strain upon its weak portion that within the inguinal canal.

Gilliam overcame this by pulling a loop of each round ligament directly through the parietes and securing it upon the external surface of the aponeurosis. It had the advantage that it could be brought through the wall at such situation as would best secure the forward position. The proper tension could be secured by traction upon or relaxation of the loop before it was secured and ensured the maintenance of the organ for ward through employment of the strong portion of the ligament. It had the disadvantage of the suspension and fixation operations in a still greater degree in that three openings or avenues were constructed in front through which coil of intestines or portions of omentum could become imprisoned. In my employment of this procedure I followed Ferguson's modification of obliterating the external avenues by quilting together peritoneum.

Simpson made an opening in the anterior fold of the broad ligament carried the loop downward beneath the peritoneum and secured it to the under surface of the rectus muscle. Through a similar opening I carried it outward between the layers of the broad ligaments until the reflexion of the peritoneum was reached when it was brought through the wall and fastened like the Gilliam loop upon the external surface of the aponeurosis. This procedure shares with all the intraperitoneal procedures the advantage that it permits of investigation and treatment of complications enables the operator to see that proper but not excessive traction is made upon the ligaments and afford opportunity to employ other means of support when undue tension would be placed upon the round ligaments. In complicated cases it leaves the pelvic cavity free from injuries which would be likely to cause subsequent adhesions.

No more than any other procedure is it applicable to all cases. In marked tendency to prolapsus with retrodisplacement it should be supplemented with other procedures such as shortening the uterosacral ligaments or folding the retro-uterine peritoneum or even closure of the retro-uterine pouch. No intra abdominal operation should be considered as a substitute for restoration of the pelvic floor in laceration or marked relaxation of the vulvar outlet. In heavy uterus or where the fundus projects much beyond the plane of the insertion of the round ligaments it is a wise procedure to secure with fine chromic catgut the peritoneum of the lower angle of the incision to the posterior surface of the fundus.

from the displacements. As a matter of fact in the majority of the cases the displacements were probably caused by the complications. This is generally the case and the showing of these gentlemen is not exceptional.

I have but a few words to say in regard to the operation which bears Dr. Webster's and my own name. As a matter of historical fact this operation was performed by Dr. Andrews of Chicago fully a year if not more prior to the publication of either Dr. Webster or myself. And if real justice is to be done and any name is to be given it should be that of Andrews.

The old saying that there are many roads to Rome is true as applied to this subject. No one can possibly imagine that Dr. Gilliam has performed all these years the operation going under his name and is still performing it if he did not get results which at least measurably satisfy himself and his clients. No one can seriously believe that Dr. Cragin and Dr. Montgomery are not satisfying themselves and their clients by their results. Dr. Webster and Dr. Bovée and Dr. Kelly and myself all make our living at our professions and it would take a considerable stretch of imagination to believe that any of us were continuing to do operations of this kind which did not satisfy you gentlemen who send your patients to us and which did not satisfy your patients. It seems to me all becoming a body of men who are presumably leaders in any given subject such as the one under discussion tonight to spend a long session in quibbling over details of technique. It would be far better to be honest with the public and admit that all of these operations have merit and that each man is probably holding to his own particular operation because of the fact that he has perfected its technique is perfectly familiar with all its weaknesses and knows thoroughly all its possibilities both for good and for bad.

The one point in the operation performed by Dr. Webster and myself which I hold superior to

all other operations is the fact that when the operation is performed not only is the uterus itself put in a proper position but the ovaries are also replaced and held up at a proper level without any extra manipulation. I do not hold that this is done better than in any other operation because there is no other operation in which it is done at all. And it is the main point of excellence between this and the operations.

As to the number of operations performed for this condition under any circumstances, Dr. Cragin is such an old and warm friend that I would hate to tell him what I thought of him for doing two hundred retrodisplacement operations in a single year. In order not to be too personal to Dr. Cragin I would like to include in that remark all the speakers of the evening who are sitting on the platform with me. Dr. Kelly comes to us and tells us there are about fifty operations which have been invented for accomplishing the result sought for in this condition. He states that he expects before he dies to see the number increased to a hundred and then he presents us with a new one of his own. If you will recall the fact that Dr. Kelly has performed about one thousand operations for retrodisplacements before he discovered that the several procedures he was following were incompetent you will wonder with me what in the world became of those one thousand women. You will also note that he states that he now believes in this new operation he advances that he has a procedure to which he can in future pin his faith with security and permanency. He has performed this operation just sixty times. Do any of you really believe that he will continue to hold to his good opinion of this operation when you recall the fact that it took one thousand times to disprove the merits of the others?

I am sorry to say it but it looks to me as though the possible number of retrodisplacement operations performed in this country is limited only by the number of females in existence.

THE BUTTON SUTURE IN ANTERIOR COLPORRHAPHY

By SIDNEY TRUFMAN WILCOX, M.D. F.A.C.S. NEW YORK

FOR the past few years I have used button sutures in operating for the obliteration of cystocele for the reason that much broader surfaces of mucous membrane are brought into apposition than in the ordinary operations. Also the long vertical suture line narrows and lengthens the vagina thus tending to push the uterus upward and to some extent hold it there

stretch. A small opening is made through the vaginal mucous membrane just anterior to the cervix. Through this the blades of a pair of blunt pointed scissors are introduced and worked up between the vaginal and cystic layers by alternately spreading and closing the blades until the two membranes are separated as far as the base of the urethra. Then the vaginal

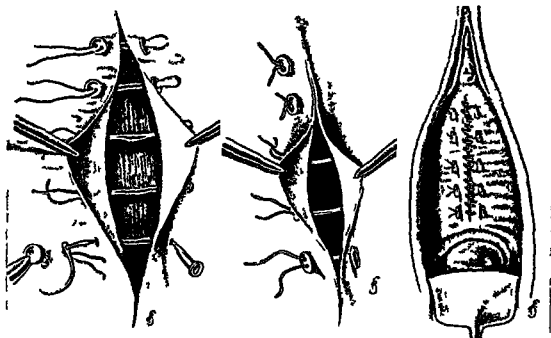


Fig. 1 Introducing the suture anterior colporrhaphy. Flaps drawn apart

Fig. 2 Approximating the flap and fastening the second row of button

Fig. 3 The operation completed. Flaps whipped together with continuous suture

This is especially advantageous when this operation is performed in connection with the operation for plaiting the round ligaments. The fact that the sutures may be left in as long as they will stay is of advantage because the support thus afforded gives an opportunity for a more substantial union.

The operation is quite simple and is performed as follows:

With the patient on the back and the perineum retracted the cervix is caught with volsellum forceps and the anterior vaginal wall put on the

mucous membrane is split vertically and the lateral dissection may be carried as far as desired with the fingers or instruments.

While the flaps are drawn taut a curved needle armed with a double suture of ten day chromicized gut (see Fig. 1) upon which an ordinary pearl shirt button is strung, is passed through from the base of one flap to the other. Three or more similar sutures are placed in the same manner. Then the second set of buttons is threaded on to the sutures and the flaps approximated (see Fig. 2). Only sufficient tension is

made to hold the flaps in approximation without undue pressure. After the sutures are tied over the buttons and cut off the flaps are trimmed down until there is about a quarter of an inch of tissue projecting beyond the edges of the but

tons. The edges of the flaps are then whipped together with a continuous suture of plain catgut (see Fig. 3). None of the sutures require removal and the buttons will come away in about two weeks.

OIL-IMPREGNATED DRAINAGE TUBING

By SELIM W. McARTHUR, M.D., CHICAGO

THE attention of surgeons is called to the great satisfaction experienced in using a properly prepared oil impregnated rubber tube in post operative drainage in localities where a serofibrinous or haemorrhagic exudate is ordinarily expected during the first twenty four to seventy two hours.

The need for such a drainage tube as will be described was first called to the writer's attention three years ago through the difficulty experienced in draining the cavity of a partial thyroidectomy. In such cases the usual small rubber drain becomes plugged every few hours with a fibrin coagulum resulting in distressing retention in the wound from an excessive serous exudate from the cut surface of the gland. This is no infrequent occurrence during the first two days after thyroid operations causing considerable tension on the fine cosmetic skin stitches in the region and often spoiling an otherwise good end result.

With this experience in mind some pure gum tubing was allowed to stand in liquid petroleum for a week. It was then found the tubing had swollen considerably the caliber almost doubled and the wall had taken on a gelatinous-like consistency. With this tubing it was possible to drain with great ease all serofibrinous (discharging) cavities coagulation not taking place within the lumen until after all flow had ceased.

During the past two years similarly prepared drainage tubes have been extensively used with marked satisfaction at St. Luke's and Michael Reese hospital on the service of Dr. L. L. McArthur and other members of the staff following many different operative procedures. They have been used and may be strongly recommended after thyroidectomies, tumors, and amputation of the breast after removal of tumors, or cyst in any part of the skeletal system in the abdominal cavity (where their softness precludes danger of pressure-ulceration and perforation

of the bowel) in general peritonitis, or to replace the usual accessory Bullitt or cigarette drain in bile-tract surgery. Also with special satisfaction in suprapubic cystostomies because of the non-deposit of urinary phosphates in and on their wall. In addition while opportunity to try it in the human has not been afforded the writer would recommend this tubing for direct transfusion purposes.

The technique of preparing such tubing as carried out at St. Luke's and Michael Reese Hospitals is very simple. Suitable pieces of pure para gum tubing are boiled for a few minutes in weak soda solution to remove traces of the surface sulphur, washed in clean water, dried and then dry sterilized in a steam autoclave. The tubing should be one-half the caliber and two-thirds the length of the desired end result because of the changed size subsequently induced by the oil. These tubes are then allowed to stand completely immersed in suitable jars of sterile petrolatum liquidum U. S. I. (or other similar good proprietary preparations of petroleum oil) for not longer than one week at room temperature. At the end of this time they are removed from the oil with proper aseptic precautions, the excess of oil shaken off and are preserved ready for use in normal salt solution containing 1:1000 bichloride.

To recapitulate the advantages of this tubing are:

1. Non-coagulation of serum etc. within the lumen.
2. Lack of granulation adhesions about them thus permitting their withdrawal with ease and the minimum amount of discomfort to the patient.
3. Diminished pressure necrosis of surrounding tissues as occur with any drainage tube.
4. The lack of clogging permits of using a much smaller caliber than would ordinarily be necessary.

The only disadvantage of such tubing is the

graduation of the 10th. In this connection a candidate should be given up if it is found to remain too long in the school and he is unable to surmount difficulties himself. In this respect, the long quarters of a school should be prepared at the same time as the school itself.

In general, the medical education should be the best of the law for the student. The teacher should be a person of high character and high ability. The student should be a person of high character and high ability.

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CORRESPONDENCE

HOW TO SHAPEN A SCHEM

The first thing to do is to get the right people. The second thing to do is to get the right money. The third thing to do is to get the right time. The fourth thing to do is to get the right place. The fifth thing to do is to get the right people.

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SEVENTH PAN-AMERICAN MEDICAL CONGRESS

The Seventh Pan-American Medical Congress will meet in Santiago, Chile, on the 10th of September, 1906. The Congress will be held in the city of Santiago, Chile, on the 10th of September, 1906.

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CHURCH A. L. RICH, Pres. of the Congress

HAS A. M. RICH, Sec. of the Congress

R. A. L. RICH, Secretary of the Congress

PHILIP M. RICH, Sec. of the Congress

TRANSACTIONS OF SOCIETIES

CHICAGO SURGICAL SOCIETY

REGULAR MEETING HELD DECEMBER 4 1914 WITH THE PRESIDENT DR DANIEL V EISENDRATH
IN THE CHAIR

MULTIPLE CHONDRO-OSTEOMA

DR NELSON M PERCY The patient of rather seven
teen years of age giving most interesting family history
which will be discussed later

Physical The boy was a normal child very well
built and well except for the fact of merisms when a
baby When about four years of age his parents noticed
a small lump attached to the outer aspect of his left ankle
and apparently attached to the bone This tumor
gradually increased in size until he eight years old
when it had reached the size of half of a small orange
The tumor later decreased in size until at the age of
thirteen years it was not noticeable except for some slight
greater contour of that ankle There was neither pain
nor impairment of motion at any time from the presence
of the mass He has never had any severe injuries

Present history When the patient was about ten years
old there was first noticed a small hard lump on the inner
aspect of the middle of the right arm as large as a
egg Until the age of fourteen years the father thought
there was no increase in size of this lump During the
past three years however the tumor has steadily grown
in size until at present it is about as large as a coconut
and causes his arm to hang about 45° from the shoulder
line He has no pain or discomfort of any kind except
that the fingers and feet become cold especially when he

lets the arm hang down especially when the tumor
presses against his chest wall He has free use of all his
joints and otherwise is perfectly well and strong except
the numbness of the fingers never noticed any other tumors on his
body

Physical examination A well-developed stockily built
well nourished boy with good color Weight 30 pounds
Head and neck negative Chest heart and lungs negative
Abdomen negative Genitalia negative

Extremities Right arm There is a large irregular
hard growth the size of a coconut on the inner aspect of
the middle of the right arm which is immovable with
respect to the humerus The arm does not hang per



Fig Radiograph showing bone tumor attached to
the middle of the right humerus Note
bowing of the shaft



Fig Radiograph showing the humerus
after excision of the tumor

[illegible][illegible]

1944 7 8

[illegible]

14

[illegible]

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING FEBRUARY 18 1915 WITH THE PRESIDENT DR ROBERT F GILLMORE, IN THE CHAIR

ABDOMINAL CAESAREAN SECTION UNDER LOCAL ANESTHESIA

DR J CLARENCE WEBSTER At the December meeting of the society I reported a series of abdominal caesarean sections carried out under local anesthesia. Within a short time after that meeting I had the opportunity of adding to my list and I want to report those cases tonight.

One was that of an Italian woman who came into the Presbyterian Hospital after having been in labor for twenty four hours. Her physician gave a history of two previous difficult instrumental labors in which the children had been born dead. On her admission she was somewhat exhausted, the foetal head was very hard and considerably larger than normal and was above the pelvic brim, the cervix being fully dilated. The patient had expressed the desire for a living child and in view of her previous experiences we decided on abdominal caesarean section. It was impossible to make any accurate measurements because the woman was very fat and resisted attempts at internal examination but it was quite evident that there was a decided disproportion between the head and the pelvic brim. She was the first Italian woman on whom I had performed the operation under local anesthesia. I think I mentioned at previous meeting the difficulties in carrying out abdominal work under local anesthesia in two Italian women but they were not cases of pregnancy. These patients had lost control of themselves and in their excitement tried to raise themselves from the table so that we were forced to hold them down and administer a general anesthetic. Dr Helli reports me that Dr Bastianelli of Rome reported that he had had very little success with local anesthesia because of the unstable character of Italian women. It was therefore with some trepidation that I began the operation in the case under local anesthesia. However it was very successful, the woman lying quiet throughout the procedure, only moaning occasionally but making no effort to move her limbs. The child weighed nine pounds and ten ounces. The firmness of the pelvis was slightly below normal.

A day or two previously a little girl thirteen years of age and some months was admitted to the hospital in advanced pregnancy. She was undersized for her years. The foetal head was too large to pass through the pelvis with uterine being reduced by craniotomy. I therefore decided to perform abdominal caesarean section and used only local anesthesia. I was also afraid that in this case we might have trouble because the child

might be expected to be excitable and unreasonable especially as she had to be brought before a large clinic. There was, however, no trouble, the patient remaining perfectly quiet throughout the ordeal. She scarcely moaned except occasionally. The child weighed eight pounds and three ounces. It was a large foetus for such a small girl.

Another case was that of a woman with placenta praevia and pulmonary tuberculosis. I used the novocaine method on her and she went through it very satisfactorily with no disturbance and the child was born in a satisfactory condition. The tubes were divided in her case.

These are the only three cases I have had since the last meeting at which I made my report.

I now wish to report two interesting cases. One of them is very remarkable. It is that of a woman 27 years of age admitted to the Presbyterian Hospital with a diagnosis made by her physician, a general practitioner, of a hernia of the fundus uteri. This woman had never had a caesarean section performed. When I heard of this diagnosis over the telephone I was rather skeptical but when I saw the case at the hospital I had to congratulate the physician on his excellent diagnosis because there was a definite fundal herniation about three inches in width on the left of the middle line rising about an inch and a half above the level of the uterine wall. When the latter contracted the hernia was made more prominent by the liquor amnii forced into it. On one occasion a foot of the foetus was pushed into it and could be very distinctly felt. The wall of the uterus at the hernial site was evidently very thin. The placenta was not attached to it. I performed caesarean section removing the herniated portion, which was only about one-eighth of an inch in thickness. There was nothing in the history to explain the causation of the hernia.

The next case is that of a woman admitted to the hospital at term giving the following history.

In her previous pregnancy she had fallen on a bread knife which had perforated the anterior abdominal wall and uterus, necessitating an abdominal caesarean section in Cook County Hospital. Within two months of the operation she again became pregnant. Under these circumstances I believed that the previous uterine scar must be weak and decided not to allow spontaneous labor to occur but to perform caesarean section. I operated under local anesthesia. I made a vertical incision about two inches from the old scar and parallel with it. Before removing the foetus I explored the uterine cavity to determine the condition of the scar of the former incision which was regular and very thin.

in several places. It was quite evident that the uterine incision had healed very imperfectly.

A MEMBER How long was the scar?

DR WEBSTER The scar was about five inches long. It is interesting to note the five inch scar because I have a specimen in my museum taken from a woman on whom I had performed the cesarean operation some years previously. The uterus and adnexa were removed on account of infective disease. The scar on the uterus was a mere white line half an inch to three quarters of an inch in length. It was well healed. The wall was half an inch thick like the uterus. It is interesting to report this because when I made the cesarean incision it must have been about five inches in length.

DR DAVIS This specimen shows on the peritoneal surface the line of the sutures. The omentum was adherent slightly over this area. On the under side, before the specimen retracted and became hardened there were three areas where the thickness was less than one eighth of an inch and there was no evidence of any musculature in that area at all. We took sections from three portions along this scar and by means of a differential stain tried to determine the nature of the tissue. This tissue with the Mallory stain showed the red of a muscle structure but not of well formed muscle cells and there was no interlacing of the strands.

DR WEBSTER I want to say one word more about local anesthesia. In general one may say that the chief distress caused the patient is the introduction of the needle. I use a little larger needle than the ordinary hypodermic needle and this some times causes slight distress. Recently I adopted a new procedure which is very simple and efficacious in relieving the patient. I administer an analgesic dose of nitrous oxide gas while infiltrating the tissues. This enables the latter procedure to be carried out carefully and without undue haste. It is therefore valuable in infiltrating large skin areas.

OBSTETRICAL ANESTHESIA

With your permission I would now like to refer to another subject viz the relief of pain in child birth. I had expected to refer to it on another occasion but am forced to do so now because of unauthorized statements which have appeared in the local newspapers.

At the Presbyterian Hospital we have been employing a method which is very simple to help women in the pains of labor. It is about ten years since I first used nitrous oxide gas in helping women over the extreme pain at the end of the second stage. At the same time I introduced it in version and forceps extraction as well as in other procedures. Ever since it has displaced ether and chloroform to a very great extent in my obstetric work. During the year 1914 gas has been used to assuage the pain of uterine contractions during a considerable period of labor by various members of the staff of the obstetric department of the hospital. All are agreed as to the great efficacy

simplicity and safety of the method. I have asked several members of my staff to report their experience to you tonight. Nitrous oxide gas alone may be used or gas mixed with oxygen (3 per cent). The latter combination has been chiefly used by me in recent years in a wide range of my work at the Presbyterian Hospital. I am convinced of this that the profession has for years neglected a most valuable means of relieving parturient women of suffering without detriment to them selves or their children. With the use of a small inhaler that covers the nose during the pain of contraction sufficient gas may be administered to abolish consciousness of the pains without interfering with their strength. Deep anesthesia is not necessary. Administration may be started at any time but it is usually necessary only in the second stage though it may sometimes be used in the latter part of the first stage. Between the pains it is with drawn and the patient is quickly restored to consciousness. There is no objection to it except on the score of expense but this varies greatly and certainly need not go over fifteen dollars in the majority of cases and may be nearer five dollars if used cautiously carefully and economically. An assistant or nurse may easily be trained to administer the gas and it may be used in a private house as readily as in a hospital.

I am strongly opposed to the scopolamine morphine method advocated by Krong and Gauss. Generations ago the general use of opium in parturient women was recognized as a dangerous procedure yet the use of morphine is now considered as essential to the success of the new twilight sleep. I believe we are now in a position to end the no toricity which the lay press has given to this method by adopting the simpler and safer procedure of administering nitrous oxide gas in light amounts during severe labor pains.

DR B F DAVIS I feel as Dr Webster has already told you that nitrous oxide gas will give the most satisfactory obstetrical anesthesia that we can obtain. The last patient that I delivered under its influence had the gas started when the second stage pains became severe. As the contraction started the inhaler was placed in position and with a small amount of gas in the bag the patient was about half asleep during the time. As soon as the pain began to ease the inhaler was taken away and in a short time she was perfectly conscious and remained so until the next pain. The patient was a primipara and the second stage was a little tedious and finally we felt that possibly she was not bearing down as much as was necessary and for two pains we gave her even less nitrous oxide until the head had become firmly fixed under the symphysis. Then only two or three pains were required for delivery and she was given slightly more gas so that she had no idea that the child was being born. She became conscious immediately and after delivery of the placenta the perineum was repaired under the influence of the gas.

In the use of morphine as a preliminary to cesarean section and the difficulty in resuscitating babies afterwards I have never felt that I wanted to use the scopolamine morphine twilight sleep method.

Dr McCULLOUGH We have used nitrous oxide in the maternity department of the Presbyterian Hospital for the purpose of easing the pains of labor during the past year. I worked chiefly with Dr Heaney with private cases but as much as possible with ward cases especially primiparae. We do not begin the use of the gas until the pains become rather severe. Sometimes we carry a patient over from two to four hours and during this time we very rarely use more than two small gas tanks. After some experimentation we found it unnecessary always to continue anesthesia through out the pain. We have used a nose-piece such as is employed in dental work the patient being instructed to breathe through it until her pain has gone. As soon as they feel a tingling sensation they are instructed to breathe through the mouth and the gas is removed. Patients will bear down with nitrous oxide the same as without it. By comparing labors with and without anesthesia I do not think the duration of labor has been increased.

Dr N SPROAT HEANEY The stage of an anesthesia that is desirable in the conduct of labor is that called by the dentists analgesia. My attention was directed to it first by a physician friend who was having his teeth filled while taking gas in this way. He told me he did not go to sleep but was perfectly conscious could talk and did not feel any pain. It is only possible to give the analgesia successfully by means of the dental nose-piece. Usually the patient is instructed to take two deep whiffs through the nose and bear down and when breath is seemingly exhausted she breathes again through the nose. When she feels that she is losing consciousness she returns to the equilibrium of analgesia by breathing through her mouth.

Dr McCullough does not think the second stage is prolonged. I have not had a sufficiently large number of cases yet to come to a distinct decision but my impression is that the second stage is materially shortened because pain does not keep the patient from bearing down. In place of pain the patient has the sensation and desire to bear down. Once or twice we tried to use the ordinary big mouth-piece. It was not successful because the patient promptly goes to sleep and does not bear down. The least amount of gas taken the more successful is the result obtained.

Previously I used gas only on cases at the Presbyterian Hospital but during the last ten days I have used it on three cases at St. Luke Hospital where the internes had a chance to compare these cases with those conducted by one of the protagonists of *Dümmersch's*. From their standpoint also nitrous oxide analgesia is more successful than morphine and scopolamine in labor and is devoid of its dangers.

Dr. RUDOLPH W. HOLMES is Dr Webster was talking of the injection of novocaine under the skin while nitrous oxide was being given lightly. I thought it would be feasible to have a compress soaked in cocaine solution applied over the site of the incision of course cocaine is very sparingly absorbed through the unbroken skin but sufficient might penetrate the skin to make the injections relatively painless. I know that there is some absorption for when I was a medical student I cut my arm deeply without pain after a preliminary application of a strong cocaine solution.

Dr Webster has stated in times past that a cesarean section once did not necessarily mean a section always. I would like to ask him whether he has modified his opinion in this regard in view of the case presented by Dr Davis. I believe it was a woman who had a patient about seven months pregnant complicated with placenta previa, and upon whom in a previous labor a section had been performed. In view of the early period of pregnancy he instructed his assistants to use a bag the patient had a rupture of the uterus in the scar before delivery was completed. On various occasions he had announced that patients who had cesareans for placenta previa eclampsia etc necessarily did not have to have sections in subsequent labors. At the next clinic Fromme corrected his teaching and announced the dictum, Cesarean once cesarean always which I have taught for some years as an obstetric aphorism.

Dr HEANEY Dr Findley saw this case.

Dr HOLMES I know Dr Findley mentions this instance in his recent paper in the *Journal of Obstetrics* but the one I had in mind was told me by my interne who a couple of years ago was in Germany in one of the obstetric clinics.

It so happened at the Augustana Hospital some years ago that a physician had a labor case which terminated spontaneously but in his eagerness to complete the third stage he tried to remove the placenta manually. What he actually did probably he himself did not know anyway she had a fundal perforation with the escape of the placenta into the abdominal cavity. I was called as well as an outside physician. Arriving first he at once proceeded to open the abdomen the uterine wound was trimmed to make a clean cut and was sewed up. A couple of years later this woman came to me for a confinement. In view of her rupture I decided on an elective cesarean which was done a week or two before the anticipated time of labor. It was fortunate that we did this, for one end of the scar was represented by a crater the size of a dollar with practically no tissue but the peritoneum. This attenuated area was sewed up. Now the attendant in the previous operation was an expert gynecologist yet he had this defect in the suturing. I firmly believe that such failures of union in the uterine musculature are not due to carelessness, not necessarily due to defective catgut but due to the enormous phagocytosis.

Dr Webster told me that his case of hernia of the uterus was near the fundus. Rokitsansky long ago pointed out that there may be a paralysis of the placental site an observation which I may corroborate as a not rare finding if it were not for the fact that the placenta is located approximately one half the time on the posterior wall we would palpate this paralysis of the placental site of Rokitsansky twice as frequently as we now do. Again there is another point in the pregnant uterus which may easily be the site of the hernial protrusion about the ora fallopi there are circular muscles which have received the name of Ruych who first described them. Long ago Oldham in England and Kirsch in Germany corroborated the fact that the area within Ruych's muscle might be an area of weakness. Some ten years ago at the Lying In Hospital I had a patient upon whom I was about to do a version. The breech was in the left horn. In passing my hand up the right side of the uterus it passed into a distinct sacculum large enough to hold my fist. I do not believe anyone would place any credence in the postulate that we had an interstitial pregnancy which had become extruded into the uterine cavity nor on the other hand that it was a dilated tube.

With reference to the administration of nitrous oxide gas in labor. If one is associated with a hospital which can get contributions without stint then it is a small matter if the obstetric anesthesia costs five to fifteen dollars, but to the usual hospital which has difficulty in making ends meet this price is prohibitive to ward and semiprivate patients. In private practice this expense of five or fifteen dollars for gas and twenty five and more for an expert to give it would likewise be prohibitive except in the families of the well to do.

Dr HEANEY. A great many of these cases can be delivered with one cylinder which makes the cost two dollars.

Dr HOLMES. I would not have anyone think I am opposed to measures for the alleviation or even the mere diminution of pain in labor. I am as eager as any to secure this beneficent result. The acrimonious discussion arisen on by Dr J. V. Simpson and the opponents to anesthesia in labor has today merely an academic interest the world stands as a unit on the advisability yet necessity for this anesthesia. Long before this hysteria of twilight sleep was aroused into being last summer I had frequently asked women how much pain they had had in labor. Some claimed during labor that they were suffering tortures others stated that the pain was endurable yet after labor many stated immediately post partum that they had no recollection of the pain others in a day or two stated the pain was forgotten. It is one of the psychological facts of labor that women soon forget the pain they had but while the pain is on it is cruelty not to assuage the pain with all possible degree that is compatible with safety.

Cognate to this question of nitrous oxide we

have the problem of the so-called twilight sleep that nitrous oxide administered in the manner described must be practically innocuous to mother and child must be conceded that scopolamine and morphine is harmless has not been proved on the contrary all the scientific evidence adduced has shown that it places both mother and child in jeopardy. As far as I can make out the routine employment of this combination is advocated by those who are seeking gratuitous advertising during the public hysteria which has been fed by the lay magazines. It would be well for this society to take action by accumulating the growing evidence of the dangers from the promiscuous and routine use of these drugs.

Dr CHANNING W. BARRETT. Perhaps a short statement in regard to the case reported would be interesting to those present and to Dr Webster particularly that is in regard to the woman on whom cesarean section was performed at the Cook County Hospital. She was well along in years before she married. She had kyphosis and as we thought it was safer to interfere with labor we elected cesarean section. She wanted to have her life saved so as to have another child and two years later she came back for cesarean section after she had been in labor some time. She had been thinking the matter over in the meantime and thought this time she would not have to come to the hospital to have cesarean section but would stay at home. She went into labor and continued in labor until dilatation was quite complete. Upon doing a cesarean section at that time we found the mark of the old scar and did not notice it was partly out of the way until we cut in at the side and found there was just the least line of tissue in the old scar—not near so much as it appears here. I supposed there was a good deal of contraction and the uterine wall appears thicker here than it did at that time. It may be that the *en masse* suture would be responsible for this, and that the layer sutures would prevent it. When I was in the Past I saw Dr Asa B. Davis do cesarean sections and was surprised to find that he closed nearly all of them with the *en masse* suture and it seemed rather objectionable. This case I operated upon myself and I know the layer method of suture does not prevent a thing of that kind. We used the layer method and yet there was the absence of that tissue. In spite of the thinness of the structure the woman had been going on with her labor but not to completion.

Dr ISABELLA C. HERB. I have been interested in gas anesthesia during labor and have also been interested in the study of twilight sleep but the latter method has never appealed to me because of the dangers connected with the use of morphine and scopolamine. We have seen that in our work before giving general anesthesia our general surgery.

Then Dr Heaney spoke of reminding me of many of the report which say that scopolamine quiets these patients—that it puts them to sleep. In many instances it has literally the opposite

effect. Scopolamine morphine was then (prior to 1902) used in labor and abandoned because of its dangers. When they begin using it again they thought on account of this condition or danger that possibly the drug was impure but it has been found that a dose taken from the same specimen affects the same person differently at different times so that you cannot always depend upon it. Nitrous oxide is an inert substance so far as having any drug effect is concerned after its use and we can really see when it is stopped how the mother or child would be left in as good a condition as if the mother had not had it.

So far as expense is concerned if we buy nitrous oxide in large tanks at a cost of buying it at regular hospital prices which is I believe two and a half cents a gallon you get it for one cent a gallon and it goes much further than small tanks that is you have a regulating apparatus which gives a certain number of pounds of pressure all the time.

Many people are becoming interested in the use of nitrous oxide and some have tried it with the knowledge that Dr. Webster had been using it in the Presbyterian Hospital in New York. I have recommended it I have never had occasion to give a thesis for medical use as I have not had the opportunity to do so but theoretically it appears to me very much. While I have suggested it I have never used it for that purpose but I am pleased to hear the results at the Presbyterian Hospital.

Dr. (JOS. H. TARNAN) I would like to ask Dr. Webster any other member whether in connection with the use of nitrous oxide analgesia he has ever noticed any tendency to postpartum hemorrhage.

I had a case seven or eight years ago of a young primipara whose brother's law was a dentist in Mexico and was accustomed to giving nitrous oxide analgesia. He came to the hospital himself and gave the nitrous oxide throughout the second stage. I thought at the time it shortened the second stage and certainly it certainly took pains very well but we had the most violent postpartum hemorrhage I have ever seen. It was quite alarming. I wondered whether any of you gentlemen have noticed any such tendency with this method.

Dr. ROBERT T. (ILLMORE) In regard to the administration of nitrous oxide I notice the advocates of it persist in saying it is used in the hospital although it can be used in houses. There is an objection to the use of it in houses because it is very hard to have the necessary apparatus which is more or less cumbersome and hard to get to the house. There is also the question of expense. There is the question of having an expert attend to it whether a nurse or doctor and he has to be there all the time.

I have used scopolamine morphine in obstetrics for eight years. I have had cases where I do not know what I would have done without it especially where the second stage was very prolonged some

times six or eight hours and if I had given nitrous oxide I myself would have been financially embarrassed and I know the patient would never have paid me for it.

With reference to the administration of scopolamine morphine I do not believe it should be given in the large doses recommended by the German clinics. I start with the 1/400 gr of scopolamine and 1/24 gr of morphine. If that does not relieve any distress in controlling pain I give the same dose. If the woman is then more comfortable and wakes up between pains I stop the morphine and give her the same dose 1/400 gr I continue that until she is practically at the end of the second stage.

In regard to the dangers of scopolamine I do not believe they exist. If one is not familiar with the administration of it he should become so. I have never had the death of a mother or child and I have never had any trouble in resuscitating a child afterwards nor with any of you if you use the drug carefully. I do not believe the average internist is competent to use it because he gives it only to a few cases. As the service I changed usually he is not quite familiar with it. I do not know how it is administered nor how to give it. Therefore I should be given by an efficient nurse under the direction of the physician from time to time or given by the physician himself under the supervision. I am inclined to think it is a useful and safe remedy in obstetrical cases.

Dr. (J. H. TARNAN) Why do you use scopolamine the first time and nitrous oxide the second?

Dr. (ILLMORE) I can let the term by name and scopolamine synonymously. As the drug is identical it is immaterial what it may be labeled or named.

Dr. (J. H. TARNAN) I would like to ask Dr. McCullough whether he was given during the second stage.

Dr. (J. H. TARNAN) Just the second stage.

Dr. WEBSTER (closing) Dr. Holmes' reference to using cocaine on the skin interests me. I was not aware that cocaine could be absorbed to any extent through the skin. I should say its action in that manner would be rather uncertain. I would prefer to give nitrous oxide gas to abolish the necessity of using the needles. However this would be necessary only where extensive infiltration is employed.

I have not made up my mind as rapidly as did Dr. Holmes' friend with regard to the question of pregnancy followed by pure cesarean section but I have listened to his position. I have now in my museum a specimen which Dr. Davis has described and shown here in connection with rupture of the uterus. It was taken from a woman on whom I had some years previously performed a cesarean section. I pride myself on my exact suturing of the uterine incision in cesarean section with successive layers of catgut. It is the only

method. Yet here was a case which was not able to stand the test of spontaneous labor.

Rupture occurred in the scar. Once a caesarean section always afterward a caesarean section is a safe rule. I do not believe a woman should be allowed to undergo more than two sections without having the tubes divided.

Dr. le Tarnowsky has referred to post partum hemorrhage. I have not noticed any tendency. I have been using gas in obstetrics for ten years and I think one would have remarked any peculiarity in this respect. I have performed a number of vaginal caesarean sections under gas anesthesia but never noticed any marked bleeding. One case of bleeding would not of course be sufficient to prove any tendency.

Dr. Gillmore objects to nitrous oxide as compared with copolamine and morphine. He should state that the latter is more uncertain more dangerous and involves the constant attention of expert assistants and nurses. I have learned from the advocates of the copolamine morphine method that its best result is obtained under special conditions not in the ordinary hospital bedroom or operating room but in the useful chambers with nice surroundings free from noise and distraction. This is a feature which man despise and which will not be readily obtained in a busy American city. The expense of nitrous oxide administration is not great and may be markedly reduced by special hospital equipment.

Those who use copolamine and morphine should frankly admit that they are using a method in which long constant contact with the physician and nurse is required to insure their full and complete use. I do not understand how a patient can turn his back to his labor with such ease.

Dr. Gillmore is not satisfied with the patient with it.

Dr. Webster is hesitant about you did. In the first place the physiological action of morphine is to relax muscles and to diminish its activity. The action of the heroin is why it was not used freely. It is so effective that it is deleterious. It is not a functional or scientific method for the administration of copolamine and morphine in the labor. Its employment in the hospital is sufficient to show. I private houses in the great majority of cases it is quite indelible. With nitrous oxide it is very different. It may be given as an anesthetic by the physician or nurse in the private house easily as in the hospital. I do not believe that Dr. Gillmore will find that the use of copolamine and morphine is anesthetic.

ON THE OCCURRENCE OF A NINE MONTH HUMAN EMBRYO IN THE MARGIN OF A FULL TERM PLACENTA

Dr. R. A. M. Ditt (by invitation) read a paper entitled "On the Occurrence of a Nine Month

meter Human Embryo in the Margin of a Full Term Placenta (See p. 561)

DISCUSSION

Dr. Emil Riss: I should say this is an early fetus papyraceus it is the undeveloped embryo of a twin pregnancy.

Dr. J. Clarence Webster: I feel rather inclined to agree with Dr. Riss that this is a case of the undeveloped embryo of a twin pregnancy. It is ridiculous to consider superfetation in such a case as this if one means by it that the embryo was only a month old. It is inconceivable that the ovum can pass down through the tube in advanced pregnancy. It is not likely that spermatozoa can work upward inside the uterus external to the placenta or the membranes. If this specimen be a superfetation it must be external to the chorion.

Dr. Moorhead: Would it not be possible for the ovum to go down?

Dr. Webster: Not in a normal condition of uterine pregnancy. It is only conceivable in case of a separation of the ovum.

Dr. Moorhead: Could not the placenta block the opening of the tube?

Dr. Webster: How do spermatozoa get up there? It is inconceivable that they can burrow up the side of the uterus external to the attached placental membranes.

Dr. Moorhead: Would it be possible for the parietal ovum to get out of the non-pregnant horn?

Dr. Webster: That has been established by a woman with a full uterus.

Dr. Moorhead: Where does it get there?

Dr. Webster: I do not know. As the embryo is a month old its well preserved cell suggest that there has been little or no degeneration.

Dr. Moorhead: It is not a demerol.

Dr. Webster: We all know what takes place in a miscarriage. The embryo soon disappears. Chorionic remnant, villi and placenta. A cell may remain for months. Dr. Moorhead: The embryo has not been on a certain stage. It may have been kept alive also during the full round. There was something you did not tell. Was there an infection or connection between the embryo and it?

Dr. Moorhead: Not any more so than the rest. There was no definite point of fusion.

Dr. Webster: As for this delicate statement the chances are the embryo had broken loose. If this be the case and if the non-pregnant horn of the ovary had been kept up merely by the fluid around it it is an interesting observation because the cells seen in the cross section of the embryo appear perfectly fresh and well preserved.

Dr. Moorhead: Would that keep it?

Dr. Webster: I do not see why it would not keep it from degenerating.

BOOK REVIEWS

A CRITIQUE OF NEW BOOKS IN SURGERY

By MAJOR G. SKEEL, M.D., ST. LOUIS

THERL still remains to be invented the elastic bookcase. The very convenient so called sectional units have made it possible to store one's books with a fair degree of comfort, but what we really need is an expansible unit, one that will permit of crowding in a few extra books without the harassing necessity of rearranging all the shelves. This month, for example, it is very much easier to establish a critical judgment on the books for review than it is to find a place on the shelves for the aforesaid volumes. Just by accident it happens that there are six bulky tomes and one smaller treatise all dealing with operative technique. No one save a professional librarian can on short notice find elbow room in his library household for seven additional books on the same subject without the assistance of a complete set of surveying instruments and a suitable supply of profane expletives.

The inconvenience however is only incidental. Of chief significance is the fact that so many good works on technique are making their appearance. Really good work we say because here of late most of the books on operative surgery present the individual views and preferences of the authors instead of chronicling a mass of data that completely muddles the reader's sense of selection. Then too most of the newer works that deal with pure technique almost invariably devote some space to the questions of operative indications. This is an admirable variance from older custom and lends healthful emphasis to the contrast between the science and art of surgery. In one of Mr. L. V. Lucas' essays there is a quaint dissertation on hot butt red toast.

To hot buttered toast, says the essayist, butler is absolutely the only accompaniment. Toast and buttered toast are as distinct as the race horse and the cart horse and both alike are admirable each in his own way. Is there anywhere a more appropriate comparison between surgical technique and surgical science than this very simple statement by Lucas regarding the relation between the substantial toast and the accessory butter?

Having thus stated our text we may proceed to illustrate it very concretely by way of this excellent English System of Surgery. In the first place the very title System of Operative Surgery is significant in so far as it demonstrates the large sphere

of importance of the purely technical side of surgery. In the second place Simon pure technique is not permitted to overshadow the other larger problem of surgery but is kept within bounds by practically all of the various contributors. This end is accomplished by adequate discussions scattered here and there throughout each one of the five volumes of such topics as General Indications, Contraindications, Difficulties and Dangers, After Treatment, Results.

Anyone who has attempted to liberate himself from a system made up of five large volumes numbering more than three thousand pages must realize the hopelessness of the reviewer's task. The very best that the honest critic can do is frankly to admit that he has only skimmed the surface and to state the general plan of the work and the impression made on his mind by the admittedly inadequate survey.

Volume I is devoted to the technique of aseptic surgery, local analgesia, amputations, vascular system, nerves, muscles, tendons, bursae, bone, joints and plastic surgery. The editor himself has contributed most of this volume and has done it well. The style as is usually the case when Englishmen write is excellent and the illustrations are without exception models. Such a very large part of this volume is devoted to amputation that one cannot avoid noting the failure of the author to devote any space to after treatment. Before the present art is over Mr. Burghard should appropriate the principles so insistently preached by Dr. Lyle of New York as essential in securing useful painless stumps.

Volume II takes up tuberculosis, bone and joint disease, operation upon the lips, face and jaws, tongue, tonsils, pharynx, oesophagus, stomach and intestines. Among the contributors to this volume are Harold J. Stiles, Edmund Owen, G. L. Cheile, Wilfred Trotter, Berkeley Moynihan, G. H. Macken and Arthur E. Barker. As a matter of fact this list of names in my well serve in lieu of a further comment. With one exception it is difficult to conceive of a more helpful series of descriptions. The exception is Mr. Barker's section on hernia. The various types of strangulated herniae are handled admirably but the pages devoted to simple herniae very distinctly lack substance and force.

Volume III is devoted to ductless glands, bile passages, pancreas, central nervous system, genito-urinary system and thorax. Stiles, Moynihan,

Berry Robson Rawling Freyer and Godlee are among the contributors to this volume. At about this time in the survey one begins to take note of the fact that this series of volumes does not mirror much of an impress of American endeavor on British surgery. For example although Mr Rawling quotes two or three American names he furnishes no evidence of the very intensive work that has been done in this country on the subject of cerebrospinal surgery.

Volumes I, and V are devoted to the specialties Ophthalmic operations operations upon the ear larynx trachea nose and accessory sinuses in Volume IV and gynecologic operations in Volume V. For the general surgeon these two volumes are in a sense superfluous. They serve the purpose however of rounding out the system. It always sounds mildly perfunctory to close a review with flattering comment on paper typography and general make up. Nevertheless and even in spite of the risk of being charged with formalism, we shall commend the Oxford Press on the high general excellence of its product.

THIS second edition of Lane's work is virtually a repetition of the first there having been added only a few radiographs which the author feels are of service in demonstrating more clearly the best mode of reduction of fragments and their retention in position. Extended comment upon the intent and scope of the work is quite unnecessary for the author's views upon this subject are widely known and a general attempt has been made to follow his teachings. The book is interesting however as a study of a most peculiar psychological situation. The prevalent notion is that Mr Lane universally advises the operative treatment of fractures and even the title of the book lends strength to this impression. In the opening paragraph the author distinctly defines his position as follows: "To operate on all cases of simple fractures of the long bones in which I was not able to obtain accurate apposition of fragments, when the restoration of bone to its normal form was of mechanical importance to the individual. And then the sense of this statement is subtly secreted and does not again appear anywhere in the text so that the casual reader impressed by the seemingly unequivocal advice to operate."

Without attempting to decide either for or against the practice advised by Mr Lane we feel that a real service may be rendered both to him and to the surgical profession by focusing the emphasis of this review upon those lines with which the book opens and without calling attention to the imperative need for a mastery of the technical difficulties we would wish only to require of the surgeon that he carefully define for himself what is meant by an accurate apposition of fragments that he consider well the

methods employed before deciding that he is unable to obtain this apposition and that before operating he be convinced that such apposition is of mechanical importance to the individual.

For the letter of Mr Lane's dictum we have no comment but we regret the peculiar psychology which permits such essential to remain quite submerged throughout the succeeding chapters of the book. By correcting this misleading suggestiveness of his work Mr Lane would most probably be relieved of the necessity of defending himself from the criticism of those who have set about to follow with disastrous results what they have wrongly understood to be his advice.

VERY much less than a year's time has elapsed (May 1914) since we reviewed in detail the first two volumes of the original German edition of Professor Fedor Krause's textbook of operative surgery.¹ It is fortunate that so little time was allowed to elapse between the appearance of the German text and the English translation. Considering how recently the original review appeared in these columns we feel that it is unnecessary to furnish detailed comment of the substance of this volume for the translation by Ehrenfried hugs the original text very closely indeed the translator modestly apologizes for a possible lack of fluency of style as an earnest of his strict adherence to the original. Translator and publisher have turned out a creditable piece of work and they both deserve commendation for the translator's task is always an arduous one tinged when it is well done with not a little of the missionary spirit and the publisher's venture is always more or less highly speculative when the reproduction of expensive colored plates is as prominent a factor as it is in this volume.

THIS little volume by Bulkley² deals so remotely with the essentially surgical phases of cancer that it hardly calls for the expression of surgical opinion and yet the monograph cannot be passed over. By consummately careful and artful screening Dr Bulkley attempts to drive home the doctrine that vegetarianism is the panacea for cancer. He does this in six chapters devoted respectively to the Nature of Cancer Frequency and Geographical Distribution Metabolism of Cancer Relation of Diet to Cancer Medical Treatment of Cancer Clinical Considerations and Conclusions.

Without practicing a too rigid critique one may object very legitimately to the title Cause of Cancer on the ground that to say the least the qualifying adjective probable should have been used. Even despite the almost infectious nature of Dr Bulkley's enthusiasm many of us will fail to find much substantiation in the arguments he uses to support his doctrine. Not only are the argu-

TEXTBOOK OF SURGICAL OPERATIONS By Prof Fedor Krause and Emil Hrym. M.D. Translated by Albert Finkelsch M.D. 12 volumes. Volumes I. New York: Rabbin Company.
CANCER: ITS CAUSE, TREATMENT By L. Danlos Bulkley. A.M. M.D. New York: P. B. Hoeber.

IN OPERATIVE TREATMENT OF FRACTURES By S. W. Arbuthnot Lane. Part V. F.R.C.S. Second edition. London: The Medical Publishing Co. Ltd.

Clinical Congress of Surgeons of North America

SIXTH ANNUAL SESSION

BOSTON

OCTOBER 25 TO 29 1915

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PRELIMINARY CLINICAL PROGRAM FOR BOSTON MEETING

THE WEEK OF OCTOBER 25 1915

MASSACHUSETTS GENERAL HOSPITAL

Monday
C A PORTER — 9 Operation Gastric Cancer of stomach
D F JONES — 9 Operations Cancer of rectum (first stage)
R C CAROT HUGH CAROT and OSCAR RICHARDSON — Demonstration Comparison of clinical evidence with postmortem findings
HUGH CAROT — 10 Operations Splenectomy for tuberculosis of the spleen
Ureterotomy for stricture
C L SCUDDER — 1 Demonstration Fractures
HUGH WILSON — 3 Demonstration Cases

Tuesday
I G BACKUS and K B HANCOCK — 9 Operations of the knee with bone plates and exploration of knee joint through medial incision
D F JONES — Clinic
C L SCUDDER and H L HEWES — Demonstration Diagnosis and treatment of chronic gastric ulcer
G W WREWSTE — Operations Splenectomy for fibrosis Appendectomy
L COLN DAVIS — Operations Ureterotomy for tumor Splenectomy

ROGER I LEE and BETH VINCENT — Demonstration Splenectomy for pernicious anemia
C C SIMMONS — 3 Demonstration Oesophagitis
G A LELAND J — 3 Demonstration Anthrax

Wednesday
F G BALCH — 9 Operations Prostatectomy Abdominal mor
R B GREENOUGH — 9 Operation Benign tumor of breast Cancer of breast
Z B ADAMS H A DANFORTH and C H BUCHHOLZ — 9 Demonstration Scoliosis
L T BROWN — Demonstration Postoperative defects
FARRAR COBB — Operations Hysterectomy for cancer (Wertheim)
HUGH WILSON — Operation Gynecological
R C CAROT HUGH CAROT and OSCAR RICHARDSON — 3 Demonstration Comparison of clinical evidence with postmortem findings

Thursday
HUGH CAROT — 10 Operations Nephrectomy for tuberculosis Pelvic tumor for tumor Prostatectomy
R C CAROT — Clinic
A S PIERCE — 1 Demonstration Congenital hypospadias
I G BACKUS and R B HANCOCK — Operations Open operation hip joint gynecology of knee joint

J J THOMAS and J W SEVER—Monday 4 Demonstration Obstetrical paralysis and fracture of the scromion process simulating it Monday Tuesday and Wednesday 3 Demonstration Treatment of paralysis by muscle training

A THORNDIKE—Monday 4 30 Demonstration End results in osteoplastic operation for spinal tuberculosis

PERCY BROWN—Monday 4 30 Demonstration Roentgen results in osteoplastic spinal operations Thursday 4 Demonstration Result of roentgen investigation in cases of fibrous stenosis of the pylorus in children Dily 10 to 4 Exhibition of roentgenograms, roentgen department

ROBERT SOUTTER—Thursday 3 Operation A new operation for flexion contraction of the thigh fan tile paralysis

A T LEGG—Thurs day 3 30 Operation Transplantation of the origin of the pectoralis major muscle in paralysis of the shoulder

A CHURCHMAN—Thursday 3 30 Demonstration Multiple enchondroma

H J FITZSIMMONS—Monday Tuesday and Wednesday 3 Demonstration Treatment of scoliosis with methods in use cases and records Thursday 4 30 Demonstration Apparatus for reduction of congenital hip dislocations

PROFS ERNEST FOLLY HUNT CANNON and WOLBACH DRS STONE and MORSE—Thursday 4 30 Clinic Infantile paralysis

Visit to orthopedic ward daily 1 to 1 The new hospital buildings will be open to inspection by visitors daily 9 to 10

Surgical Department

J S STONE W F LADD C G MIXTER and T W HAMMER—Daily 1 to 1 Surgical operations Harelip cleft palate empyema hernia cervical dentigerous abscess fingers hypoplasia undescended testis etc

C G MIXTER—Tuesday 2 30 Demonstration Imperforate anus Wednesday 3 Demonstration Tuberculous peritonitis Pyloric stenosis Undescended testis

W E LADD—Tuesday 3 Demonstration Cervical adenitis Wednesday 3 30 Demonstration Intussusception Hip retractor cleft palate

J S STONE W E LADD and J J THOMAS—Tuesday 3 30 Demonstration Fractures in children subperiosteal and epiphyseal elbow joint fractures Volkmann's ischaemic contractures

J S STONE—Wednesday 3 30 Demonstration Some obscure abdominal conditions Empyema Harelip and left palate Acute epiphyseal lesions

T W HAMMER—Wednesday 3 Demonstration The treatment of birthmarks

PROFS ERNEST FOLLY HUNT CANNON WOLBACH DRS LOVETT STONE and MORSE—Thursday 4 to Clinic Cervical adenitis

DRS CROSSBY G REVE and F E GARLAND three after noon Eye Ear Nose and Throat clinic Visit to general surgical ward daily 1 to 1

PETER BENT BRICHAM HOSPITAL

HENRY CUSHING—Daily Clinics or demonstrations Surgery of the brain pituitary body spinal cord peripheral nerves

DAVID CREEVER and JOHN HOMANS—Daily Operations Surgical

HENRY A CHRISTIAN CHANNING FROTHINGHAM and others of the medical staff will co-operate in giving clinics or demonstrations on selected topics such as the electrocardiogram etc

MASSACHUSETTS HOMOPOATHIC HOSPITAL

Monday

A G HOWARD and H MOORE—9 Operations Orthopedic

J H PAYNE and D W WELLS—9 Operations Eye DRS RICE HOUGHTON and C SMITH—2 Operations Nose and throat

W F WESSELHOEFF and T F CHANDLER—Operations General surgery

Tuesday

J F BRIGGS and C T HOWARD—9 Operations General surgery

G A SUTTA and A W HORN—9 Operations Eye HORACE PACLAUD and C T HOWARD—2 Operations General surgery

DRS RICE HOUGHTON and SMITH—Operations Nose and throat

Wednesday

DRS RICE HOUGHTON JOHNSON SMITH and BUSH—9 Operations Nose and throat

GEORGE H CARL and H MOORE—9 Operations Orthopedic

W F WESSELHOEFF and R C WIGG—Operations General surgery

F W COLBURN—2 Operations Ear

Thursday

J F BRIGGS and C C ANGE—9 Operations General surgery

DRS RICE HOUGHTON and C SMITH—9 Operations Nose and throat

G R SOUTHWICK—Operations Gynecological

Demonstration

W H WATTS—Surgical pathology

G A SUTTA—Ophthalmoscope

Routine Examination of Ante partum Cases—Wednesday

Social Service Clinic Post partum Cases—Thursday

Daily clinics at twilight sleep

Daily exhibition of new maternity building

FREE HOSPITAL FOR WOMEN

DRS GRAVES PEMBERTON WADSWORTH HUTCHINGS and BAKER—Tuesday Wednesday and Thursday 9 Operations Gynecological

DR PEMBERTON—Wednesday 3 Cystoscopy demonstration

DAILY CLINICS—Thursday 30 Demonstrations Laboratory specimen

CARNEY HOSPITAL

- J T BOTTOMLEY and D I MAHOVEY—Monday
Wednesday and Friday 9 Operations Surgical
W R MACAUSLAND and A R MACAUSLAND—Monday
Wednesday and Friday 9 Operations Orthopedic
I W JOHNSON and S RUSHMORE—Tuesday and Thursday 9 Operations Gynecological

ST ELIZABETH'S HOSPITAL

- Drs LANE and SUPPLE—Monday and Thursday 9
Operation
Dr CROMY—Monday Thursday and Friday W rd
visit, Wednesday 9 I traneous salivarian
junctions
Dr BRODERICK—Tuesday 9 Orthopedic operations
and clinic
Dr CRUTE—Wednesday and Friday 9 Operations
Genito-urinary
Drs BRAVERMAN and HOLMES—Tuesday 9 Nose and
throat clinic
Dr DOWNING—Monday and Friday Demonstra-
tions Laboratory technique
Dr BUTLER—Tuesday and Thursday Demon-
strations Ray
Drs McDONALD and McADAMS—Wednesday
Eye clinic

The history diagnosis and indication for operation in each case will be discussed previous to operation by D Cronin of the medical service and D Butler of the roentgenological department

ROBERT BRIGHAM HOSPITAL

- CHARLES F FAIRYER EDWARD RICHARDSON LLOYD T BROWN and RICHARD MILLER—Tuesday and Thursday—Operations Monday Wednesday and Friday 3 Clinics Surgery of chronic diseases, arthritic intestinal tuberculosis, peritoneal adhesion hemolytic diseases

LONG ISLAND HOSPITAL

- F H LAHEY—Monday Operations
J H CUNNINGHAM—Tuesday and Wednesday
Operations
ROBERT SOUTTER—Thursday and Friday Operations

TUTT'S MEDICAL SCHOOL

- A W GEORGE—Daily to 5 Rontgenological demonstration

NEW ENGLAND HOSPITAL FOR WOMEN AND CHILDREN

- MARY A SMITH and ARBY M O'KEEFE—Monday and Thursday Operations Gynecological
ELIZABETH T GRAY and LETITIA D ADAMS—Monday Tuesday Operations Gynecological
EMMA B CULBERTSON and GLADYS COOPER—Tuesday and Friday Operations Gynecological
FLORENCE DUCKERING and LETITIA D ADAMS—Wednesday to Thursday Operations Gynecological

- MAUDE CARVILL—Thursday 9 Eye clinic
MARGARET NOYES—Wednesday Ear nose and throat clinic
ISABELLE D KERR—Friday Ear nose and throat clinic

Scopolamine morphia anesthesia both with and without ether will be used during these clinics Statistics, covering six years continuous use of this form of surgical anesthesia on over 400 cases re available Dr Abby M O'Keefe professional anesthetist has entire charge of this department

HOUSE OF THE GOOD SAMARITAN

- Drs SOUTTER LEGG and SEVER—Monday, Wednesday and Friday 1 Clinics Infantile paralysis, muscle transplantation flattened condition of the head of the femur basilar paralysis

CODMAN HOSPITAL

- E A CODMAN—Tuesday 9 Operations Surgical Demonstration of lesions about shoulder joint Thursday Operations Surgical Demonstration of lesions of duodenum

MASSACHUSETTS CHARITABLE EYE AND EAR INFIRMARY

- Drs C OCKETT MOSHER and EMERSON—Monday and Friday Otolological clinic
Drs JACOB WALKER POWERS and BLODGETT—Tuesday Otolological clinic
Drs HAMMOND WHITE and FAUNCE—Wednesday Otolological clinic
Drs JACK KNOWLES TONBY and BOGAN—Thursday Otolological clinic

Eye clinic daily from 9 to 1 Various operations on lids, tear sac and muscles of the eye Different types of operation for cataract and glaucoma Magnet operations for the removal of foreign bodies from the eye Different methods of using local anesthesia Tuberculous of the eye Interstitial keratitis of specific origin Ophthalmia neonatorum and gonorrheal ophthalmia in adults Local irrigation of foreign bodies in the eye by the X ray Demonstration of ophthalmometer for measuring astigmatism of the lens Demonstration of lantern slides by pathological department

HARVARD MEDICAL SCHOOL

- PROF COUNCILMAN and MALLORY—Demonstration Pathology
PROF CANNON and W T PORTER—Demonstration Physiology
PROF FOLIN—Demonstration Chemistry
PROF STROM—Demonstration Tropical Medicine
PROF RICH HUNT—Demonstration Pharmacology
Drs ORDWY and TYLER—Demonstration Cancer research
JOHN WARREN—Demonstration Anatomy
W F WHITNEY—Demonstration Women anatomical museum
F T LEWIS—Demonstration Embryology
J E GOLDTHWAIT—Demonstration Visceroptosis

MAY 1915

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**Zentralblatt für die gesamte Gynäkologie und
Geburtshilfe sowie deren Grenzgebiete Berlin**

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EDITORIAL ANNOUNCEMENT

Of very great interest to the radiologist in roentgenology and a well to the surgeon and internist will be a review of our present-day knowledge of the roentgenology of gastric ulcer prepared by Dr. A. W. Crane of Kalamazoo, Michigan to appear in the June number of the INTERNATIONAL ABSTRACT OF SURGERY.

Dr. Crane deals with his subject in a most practical and comprehensive manner. The first part of the review covers the technique of the examination and in the connection the preparation of the contrast meal. The preparation of the patient, screen and plate procedure are discussed at length. The direct and differential diagnoses of gastric ulcer based on anatomical, physiological and roentgen clinical screen findings are dealt with in the second part of the review.

In conclusion Dr. Crane discusses the stage of cancer at which roentgen signs become observable and the reliability of this method of diagnosis of gastric cancer. His bibliography because of its completeness will be of exceptional value since the large majority of the material has been drawn from foreign publications.

Other collective reviews to be published during the next few months are:

Mechanism of Fracture	LEWIS R. RYAN, M.D., San Francisco
The Relation Between Cystic and General Peritoneal Disease	ROBERT R. WILSON, M.D., Chicago
Tuberculosis of the Genitourinary Tract	J. H. CUNNINGHAM, JR., M.D., Boston
Cancer of the Mouth	A. L. BLAIR, M.D., St. Louis
A Comparison of the Results in the Conservative and the Surgical Management of Esophagus	FRANK L. ELLIOTT, M.D., New York
Surgery of the Bladder	J. HENLEY, M.D., New York
The Use of the High Frequency Current in the Treatment of the Bladder	H. R. C. BAKER, M.D., New York
Uterine Hemorrhage	P. W. R. ELLIOTT, M.D., Omaha, Neb.
Cancer Treatment with X-Rays and Radium	J. K. LUM
The Status of the Operation of Stomach	C. TAYLOR, M.D., Chicago
Intestinal Obstruction	A. D. L. RYAN, M.D., Chicago
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Pregnancy and Tuberculosis	J. H. CUNNINGHAM, JR., M.D., Philadelphia
The Surgical Treatment of the Double Urinary	C. A. MANN, M.D., New York
The Present Status of Radiotherapy	A. H. WARD, M.D., Montreal
Dignity of the X-Ray in Intrathoracic Disease	H. R. C. BAKER, M.D., New York
Surgery of the Seminal Vesicles and the Prostate	J. H. CUNNINGHAM, JR., M.D., St. Louis
Significance of Radium	J. H. CUNNINGHAM, JR., M.D., Philadelphia

INTERNATIONAL ABSTRACT OF SURGERY

MAY 1915

COLLECTIVE REVIEW

THE PARATHYROID GLANDS

By EUGENE H. POOL, M.D., F.A.C.S., New York.

Attending Surgeon, New York and French Hospitals

THE parathyroids were first described in 1880 by Sandstrom who published an accurate description of their gross anatomy and histology but no physiological significance was attached to these structures until 1891 when Gley demonstrated their relationship to tetany. From that time extensive experimental and anatomical studies have been carried on and it has been demonstrated to the satisfaction of most authorities that the parathyroids are specific organs.

To the surgeon the paramount interest in the parathyroids has been dependent upon the occurrence of tetany as the result of accidental removal of these bodies in operations upon the thyroid gland. However the technique of partial thyroidectomy as now practiced is so planned as to safeguard the parathyroid consequently tetany is a rare sequel to the operation. Yet occasionally post operative tetany occurs and such cases have stimulated much speculation in the direction of therapeutics. The therapeutic problem as well as the explanation of tetany itself is obscured by the uncertainty which prevails as to the physiological import of the glands. Enlightenment on these features must await a better understanding of the parathyroid secretion and it is upon the unfolding of the subtleties of this internal secretion that the broad interest in the parathyroids now centers.

ANATOMY

The parathyroid glandules (Sandstrom) or epithelial bodies (Kohn) are branchial cleft

derivatives. They develop from the third and fourth branchial clefts of each side as masses of compact epithelial cells. Getzowa has advanced the hypothesis that an independent third parathyroid may be developed from the fifth branchial cleft. There is no proof of the assumption advanced by Vincent and Jolly and Kishi that the parathyroids are embryonal thyroid tissue and may under certain conditions develop into the mature tissue of that gland.

The occurrence of the glands in pairs may properly be considered the typical arrangement a superior and an inferior body being present on each side. Four glands are therefore the usual number but it must be emphasized that exact enumeration in an individual case is difficult for two reasons: (1) Their small size and variable position render it an easy matter to overlook one or more of the bodies. (2) Various tissues may be mistaken for a parathyroid especially lymph nodes, accessory thyroids and fat. Only microscopic examination can exclude these. In the studies of the anatomy of the parathyroids dissections have usually been made after removal of the thyroid and adjacent soft parts but Fischer has recently advocated dissection with the structures *in situ* so as to preserve the relations of the thyroid vessels. The only exact method of recognizing all parathyroid tissue is by serial sections of the soft parts of the neck and mediastinum as performed by Erdheim. Variable success has been attained by investigators in identifying the parathyroids. Berkeley found in 40 cases an average of approximately

two and one half glands. Getzowa in 100 cases found four glands in one-third of the cases. Verebely in 138 cases found four parathyroid 108 times. Vanase in 89 examinations found four parathyroids 50 times three 23 times two 12 times and one 4 times.

The parathyroids are found most frequently in the following situations which may be considered the normal arrangement although extreme variations from these positions are frequent. The superior the more constant in position most often lies close to the thyroid in the middle third of its posterior border approximately on the level of the lower border of the cricoid cartilage (Welsh) in the angle between the trachea, oesophagus and thyroid. It lies on a plane posterior and external to the recurrent laryngeal nerve usually in close relation hip to terminal branches of the inferior thyroid artery.

The inferior ordinarily lies behind the lower third of the thyroid. It is most frequently on a plane anterior to the recurrent laryngeal nerve and in close relation hip to and usually anterior to the lower branches of the inferior thyroid artery. Not infrequently however the inferior parathyroid lies at or below the lower pole of the thyroid even within the mediastinum.

The relation of the bodies to the thyroid gland is of considerable surgical importance. In most cases the parathyroid lies close to the thyroid yet entirely external to its true capsule. Under such conditions they lie in close relationship to the surgical capsule and are usually invested by some of the fibers which constitute this fascial layer in such a way as to be held to it rather than to the thyroid when the capsule is stripped from the thyroid. Occasionally a parathyroid lies in closer relationship to the thyroid even within a cleft but not in rare cases is it embedded in its substance.

The blood supply of the parathyroid has been described by Halsted and Evan approximately as follows. The artery to the lower parathyroid usually less than five millimeters in length arises from a branch of the inferior thyroid artery. In a few instances where the inferior parathyroid gland was found below the lower margin of the thyroid the artery between two and three centimeters in length coursed as a distinct usually unbranched vessel to the hilus of the glandule. The artery to the upper parathyroid gland is derived from one of the main branches of the inferior thyroid or from an anastomosing channel running along the posterior margin of the lateral thyroid lobe joining the superior and inferior thyroid arteries.

After ligation of an inferior thyroid artery the parathyroids of the same side may be supplied with blood from the superior thyroid artery and after ligation of the superior and inferior thyroid arteries of one side it is possible that the parathyroids of that side may be supplied through anastomoses by the vessel of the opposite side (Cris) as well as by anastomoses with pharyngeal, oesophageal and tracheal vessels.

Nerve fibers presumably from the sympathetic have been demonstrated by Rhinehart in close relationship with the vessels of the parathyroids. Since he found no fiber within the parenchyma he assumed that these were vasomotor and not secretory nerves.

Accessory organ that is, small supernumerary encapsulated glandules have been found not infrequently in various positions in the neck but especially below the thyroid within the thorax and even within the thyroid. Moreover small accumulations of characteristic parathyroid cells have been noted especially by Getzowa in the thyroid and in the adipose tissue adjoining the thyroid.

The size of a parathyroid gland varies from about 3 mm to 15 mm the average being about 6 x 4 x 2 mm (Berkley). The bodies are usually somewhat flattened and may be of various shapes but especially round oval or reniform in some cases there is a distinct hilus. Occasionally a parathyroid is subdivided into two distinct parts. The color is brown red or a reddish yellow.

Histologically the organ consists of a mass of cells invested by a thin fibrous capsule from which irregular processes reach inward. The gland has a reticular stroma and is as a rule strikingly vascular presenting numerous large capillaries. Frequently fat is present the amount being relatively great in advanced life and slight in childhood. It occurs both as an infiltration of the stroma and as a cellular metamorphosis chiefly in the principal cell (Erdheim Fischer). The distribution of the cell varies greatly. They may form an extensive cell mass with only occasional interruption by vessels and fibrous strand or they may be broken up by vessels and connective tissue so as to form clusters of lobules or netlike trabeculae. Rarely there is an alveolar grouping of cuboidal or somewhat cylindrical cell with basal nuclei. These occasionally surround a lumen filled with colloid the character and significance of which have given rise to much discussion. The occurrence of glycogen has been repeatedly demonstrated.

The cell grouping is rarely limited to one of the

above structural types as a rule there is a combination of the varieties, the divergencies presented by individual glands in this respect being very wide. The cells themselves are mostly polygonal, sometimes round or cuboidal. They were subdivided by Welsh into two distinct types and the classification in the main has been universal ly accepted.

Type I Principal cells These are by far the more numerous. The cell body is relatively small and is either feebly stained with basic aniline dyes or is clear and colorless, in which case the cells present only a nucleus and membrane which takes a deep eosin stain. Some of the cells which belong to this group at times present a stained peripheral zone and a clear cytoplasm immediately around the nucleus (Getzowa Pool). The variations in the relative width of the clear and the stained zones suggest that under certain conditions the cytoplasm of the clear cells takes on a stain which acts first near the periphery and then progressively toward the nucleus until the whole cell body may be stained. The nucleus with open chromatin network, large pale often ovoid and frequently eccentrically situated. Getzowa has designated the clear cells of this group *wasserschelle* and the stained cells *rosarote*.

Type II Oxyphile cells These have a relatively large finely granular body, the granules of which stain deeply with eosin. The nucleus with closely arranged chromatin is small and takes a deep stain. Compact masses of these cells frequently may be seen especially immediately beneath the capsule. They are relatively more frequent in advanced life than in youth (Fischer, Getzowa, Vanase).

Petersen added a third type, the cells of which are smaller than in Type I, there is no sharp boundary to the cells of which the granular protoplasmic body stains deeply with eosin in places the cells are so small that nothing is seen but a complex of deeply stained nuclei.

Following the analogy of the salivary and other glands it has been suggested that the granular cells are a functioning and the clear cells a resting condition but the relationship of the cell groups to the function of the gland has not been established. A summary of the arguments which bear upon this feature is given by Guleke.

PHYSIOLOGY OF THE PARATHYROID GLANDS

That there is a correlation between the functions of the various glands of internal secretion is now generally believed but in what manner and to what extent the parathyroid bodies affect

and are affected by the thymus, thyroid, pituitary, adrenals, pancreas, spleen and generative organs is hypothetical.

The iodine content of the parathyroids is uncertain. Some (Gley, Jeandelize) claim to have found a relatively large amount; others claim that there is little or none (Evans and Cecil, Chenu and Morel). Berkeley and Beebe have isolated a nucleoprotein from the gland.

The function of the parathyroids is unknown. Hypotheses as to their physiology are for the most part founded upon the relationship of the parathyroids to tetany.

RELATION OF THE PARATHYROID GLANDS TO TETANY

The occurrence of tetany after operations for goiter was first emphasized by Weiss in 1880, although reports of a few cases of undoubted tetany following goiter operations had been made prior to that time. In 1883 Kocher and Reverdin called attention to the condition since known as *cachexia strumpriva* and this was shown by Kocher to be a frequent sequel to complete thyroidectomy. The two diseases, tetany and *cachexia strumpriva*, were regarded for a considerable time as different phases of one condition which was supposed to be dependent upon insufficiency of the obscure function of the thyroid gland.

Animal experimentation. The above clinical contributions stimulated interest in the study of the thyroid by animal experimentation. As a result Schiff in 1884 demonstrated that after complete removal of the thyroid gland certain animals, notably cats and dogs, usually developed spastic and fibrillary contractions—tetany—followed by death. In isolated cases where the animal survived it was supposed that the thyroid function was carried on by aberrant or accessory thyroids. Schiff's observations were corroborated by many investigators.

The results of animal experimentation presented a perplexing inconsistency. While total thyroidectomy in dogs, cats, and carnivora in general was followed by fatal tetany in contrast to these animals, rabbits and other herbivora regularly survived the operation with no evidence of tetany but with the development of the slower *cachexia strumpriva*. The peculiar difference in the reactions of these two classes of animals to the removal of the thyroid gland was the crux which for a long time defied explanation. Its ultimate solution however furnished the clew which resulted in rapid advances leading up to our present knowledge of the subject. The credit for this all important step is due to Gley.

who in 1891 called attention to the existence in the rabbit of two small bodies—the outer parathyroids—one on each side entirely separated from the thyroid. He demonstrated that the removal of these together with the thyroid (complete thyroidectomy) as a rule produced tetany. Gley's findings were corroborated by many more; moreover in other animals numerous investigators demonstrated that the removal of the thyroid together with the parathyroids usually resulted in fatal tetany. In cases where tetany did not develop accessory parathyroids were assumed to be present.

Kohn in 1893 called attention to the inner parathyroids in the dog and cat and later in the rabbit. This important contribution led to the first practical step toward ascribing to the parathyroid an independent potency. Vassale and Generali in 1896 demonstrated by striking experiments upon cats and dogs that the removal of the four parathyroids, the thyroid being preserved, quickly led to fatal tetany while no tetany resulted from the removal of the thyroid if the parathyroids were left.

Biedl, Erdheim, Moussu, Walbaum and many others have removed the parathyroids and left the thyroid in various animals. These experiments are too numerous to cite. The results indicate that complete removal of the parathyroid tissue results in fatal tetany. Erdheim's observations are especially convincing. After total destruction of the parathyroids in rats, with the minimum of injury to the thyroid tetany occurred in all the cases. In these animals by systematic serial microscopic sections of all the organs of the neck, Erdheim demonstrated the presence of the thyroid and absence of parathyroid and thus established the fact that the lesion in every case was purely parathyreopriva. On the other hand it must be recognized that in a certain proportion of cases in the experience of practically all experimenters tetany has not followed supposedly complete parathyroidectomy. However the complete absence of parathyroid tissue can be verified only by serial sections as performed by Erdheim but on account of the great amount of labor which this entails serial sections rarely have been made.

The percentage of cases of tetany following parathyroidectomy varies considerably in the hands of different experimenters and in different animals, being particularly low in rabbits and goats and high in dogs and cats. The facility with which the organs are found and removed varies greatly in different animals. Anatomical peculiarities probably explain in large measure

the discrepancies. While in most animals there are four parathyroids this is not an invariable rule. The positions of the bodies likewise vary in various animals especially their relation to the thyroid, moreover accessory parathyroid tissue in variable situations is frequently present.

It has been urged by numerous experimenters among whom are Biedl, Walbaum, Vassale and Generali, that the intensity of tetany parathyreopriva stands roughly in inverse ratio to the number of healthy parathyroids retained by the animal. This rule however is certainly far from absolute for sometimes the presence of one parathyroid is sufficient to prevent the symptoms of tetany while in other cases two of the organs are necessary (Erdheim). The difficulty of formulating any exact deductions in regard to this phase of the subject is increased by the fact that besides frequent variations in animals of the same species there is a constant and marked variation in the reaction of different species to partial or complete parathyroidectomy in respect to the rapidity of the onset and the intensity of the symptoms. Investigations bearing upon partial parathyroidectomy have been made in various species of animals by Gley, Vassale and Generali, Pineles, Moussu, Jeandeluz, Edmunds, Berkeley and Beebe, and others.

Apparently an animal can support a marked degree of parathyroid deficiency better if parathyroids are removed in several stages than in a single stage. This has been attributed to compensatory hypertrophy of the remaining parathyroid tissue and this explanation is supported by the findings of many of the above-named workers.

After partial removal of the epithelial bodies relative insufficiency of the parathyroid function—latent tetany—may occur. Under such conditions tetanic attacks may be precipitated in an apparently healthy animal by circumstances favorable to its development such as pregnancy and lactation (Adler and Thaler, Erdheim, Halsted, Vassale, Schmiedlechner and others). Guleke considers this feature important in connection with human tetany.

Experiments have been performed to determine the effect of depriving a parathyroid of its blood supply, according to Thompson and Leighton cutting off the blood supply may produce a variable degree of cell death followed by fibrosis. Regeneration of injured parathyroid tissue by cell proliferation occurs, if at all only to a slight extent (Erdheim, Fiori).

Certain extraneous influences affect the development of tetany. A meat diet appears to

accentuate the tetany more than a diet of milk (Blum) a cold environment is said to intensify the manifestations of tetany

Into the detail of tetany in animals we can not enter exhaustively. As Guleke states it has been shown by experimental work that tetany in animals may be acute and fatal or transitory or it may become chronic. The differences may depend upon the degree and suddenness of curtailment of parathyroid function by removal or injury and upon the fact that certain species of animal appear prone to present a given type of tetanic manifestations thus tetany in a dog is usually acute and rapidly fatal whereas in the adult rat it is markedly chronic.

The symptoms of acute tetany are chiefly fibrillary twitchings tremors local or general contraction (tonic or clonic) convulsions dyspnea tachycardia ptialism general weakness prostration and electrical hyperexcitability. The electrical excitability has been studied among others by Schultze and Wilcox.

The symptoms of chronic tetany (cf Guleke) consist chiefly in trophic disturbances of the skin hair and mucous membranes cataract formation (Erdheim) inhibition of the bone growth in the young and limitation of callus formation in adults diminished deposit of calcium in the new formed dentine of the incisor teeth of rats—rodent—(Erdheim) loss of weight cachexia and a condition of stupor. But it must be emphasized that a sharp line of demarcation can not at present be drawn between metabolic changes which are due to deficiency of the thyroid and those due to deficiency of the parathyroids.

The Pathogenesis of tetany. The hypothesis has been advanced by MacCallum Frommer Lundborg Vassale Pineles and others that the parathyroids have an antitoxic action the suppression of which results in the tetany reaction. By this hypothesis tetany parathyreopriva would be explained as an autointoxication and one and perhaps the chief function of the parathyroids would be the prevention of the action of certain toxic substances regularly present in the circulation. In support of the assumption that there is a circulating toxin is the fact that the disease in animals is temporarily relieved by bleeding and the injection of salt solution or blood into the veins (Joseph and Meltzer MacCallum von Furth etc). The transmission of tetany to a healthy animal by transfusion of blood from one affected with the disease has been attempted by many investigators but with contradictory results. MacCallum carried out some ingenious

experiments in this connection. It was demonstrated that after section of a nerve during tetany the isolated extremity remained hyperexcitable and that such an isolated extremity became hyperexcitable if extirpation of the parathyroids was carried out after the cutting of the nerve. Then by connecting the blood vessels of an animal in the height of tetany with those of the leg of a normal animal so that the peripheral portion of the nerves of the limb of the normal animal were bathed in tetany blood it was demonstrated that an excitability identical with that found during tetany appears very quickly in those nerves and as quickly gives place to the normal conditions when the femoral vessel are reunited with their stumps so that the nerves are again supplied with normal blood. In the same way the flooding of one leg of an animal in tetany with normal blood reduces the excitability of the nerves of that leg to the normal while the rest of the animal is in tonic and clonic convulsions. MacCallum further states that after the extirpation of the parathyroid gland there appears gradually a profound change in the blood which makes it capable of acting upon the nerves in such a way as to make them respond to electrical stimuli far more rapidly than is normal. He inclines to the belief that tetany is closely dependent upon a disturbance of the calcium content of the blood. He states that direct analysis of the blood of an animal in tetany shows it to be very poor in calcium (MacCallum and Vogel). Nevertheless Cooke and others have questioned the importance of the calcium decrease in tetany.

No constant lesions have been demonstrated in the nervous system in tetany although much work has been done upon this phase of the subject.

RELATION OF THE PARATHYROIDS TO TETANY IN MAN

Studies of tetany in man indicate that the pathogenic influence of the parathyroids is the same as in animals. Moreover the clinical manifestations resulting from limitation of functioning parathyroid tissue is essentially the same in man as in animals. That tetany following goiter operations is due to the removal of the parathyroid glandules seems to have been proved not only by a long series of careful experiments upon animals, but likewise by significant findings of Erdheim Pineles, and others in man. Nevertheless, there are some observers who are skeptical as to the truth of this assumption and among them are competent men who have weighed carefully all sides of the question (Forsyth

Kishi Vincent and Jolly) They do not admit the potency of the parathyroids they deny that the parathyroids have a function independent of the thyroid and deny that the removal of the parathyroids is the cause of tetany The explanation of this divergence of opinion lies in the fact that besides such apparently conclusive experimental results as those described above there have been as previously stated numerous other investigations the results of which have not been uniform or positive However it is fair to state that almost all observers with the exceptions mentioned regard tetany following goiter operations as the direct result of diminution of functioning parathyroid tissue

As proof of the influence of the parathyroid in tetany Irdhucius studies of three cases of human tetany are remarkably significant In each a partial thyroidectomy was performed for goiter Unquestionable tetany developed shortly after the operation and death followed on the one hundred thirty first fifth and seventh days Complete serial microscopic sections of the organs of the neck showed in each case the presence of a considerable amount of well preserved thyroid tissue whereas in the first case none of the four usual parathyroid were found and only two very small accessory parathyroid which lay in the isthmus in the second case only one parathyroid was recognizable and that was practically entirely necrotic in the third case not one of the regular four nor even an accessory organ was found Von Eiselsberg in a case which developed fatal post operative tetany likewise proved by serial sections the absence of parathyroids

A review of all cases of tetany which have been reported as occurring after strumectomy would prove unfruitful Guleke estimates the number as about 160 and cites many of them During the period when complete thyroidectomy was practiced tetany was comparatively frequent Of particular practical interest are the reported cases of partial thyroidectomy which permit definite conclusions to be drawn as to the involvement of the parathyroid in the extirpation Pineles compiled thirteen cases of this kind six cases of extirpation of both lateral lobes four cases of preservation of the upper portion of one lateral lobe and three cases of extirpation of a lateral lobe with the isthmus As a result he pointed out that tetany follows partial thyroidectomy most frequently in those cases where extirpation of or injury to the parathyroids is most likely to occur therefore tetany is most likely to follow those cases in which only

the isthmus or upper part of one or both lateral lobes is left Cases by the following are cited by Guleke as demonstrating the occurrence of tetany when the isthmus only was left Czylharz Reichel Schiller Suman Furetta to these may be added the second case reported by the writer Guleke cites cases by the following in which the lower poles and isthmus were removed Boese Branham Danielson von Eiselsberg Geist Kocher Lorinz Monnier Oberst Shepherd

Tetany has occurred after comparatively slight interference with the thyroid Iversen states that seven cases have been reported after removal of one lateral lobe of the thyroid such cases must be explained as due to an anomalous number or distribution of the parathyroids According to Iversen tetany likewise has occurred in four cases where only enucleations were performed two of these were fatal

Cutting off of the blood supply of the parathyroids may result in tetany That a light tetany can develop when the four arteries are ligated is readily understood but the fact that tetany occurs only rarely as a result of this procedure is surprising (Iversen) Although Kocher von Eiselsberg and others have noted tetany after ligation of all four arteries frequently four ligations have been performed without resulting tetany It is probable that cutting off of the blood supply of a parathyroid may cause temporary loss of its function or even permanent destruction by necrosis yet this is apparently rare presumably by reason of the free anastomoses It is difficult however to reconcile the fact that a graft may prove viable if a parathyroid deprived of its blood supply but otherwise undisturbed may undergo necrosis It has been suggested further that operative trauma the pressure of a goiter or of scar tissue may at times give rise to temporary cessation of the functional activity of the organ affected

How many parathyroid can support health with no evidence of parathyroid deficiency cannot be positively stated Iversen as the result of an analysis of the cases of human tetany inclines to the belief that two parathyroids are essential and sufficient

Various reports have been made in regard to the frequency with which parathyroids are found in the specimen removed in operations upon the thyroid gland Iversen states that one or two parathyroids are removed in over half of the cases of extirpation and resection MacCallum and others have not found so large a percentage which may fairly be assumed to be exceptionally high

Delore and Alamartine estimate that bilateral operations have been performed upon the thyroid in 80 per cent of all cases of post-operative tetany. In a considerable number of cases such as the two reported by the writer tetany has followed partial or total extirpation of the second lateral lobe the first having been removed at a former operation. In such cases it must be assumed that the parathyroids on one side were sacrificed at the first operation and that the second operation removed further parathyroid tissue or disturbed the functional activity of the remaining organs.

It follows from an analysis of the reported cases that the occurrence intensity and course of post operative tetany in man are dependent upon the amount and functional usefulness of the parathyroid tissue that is left (Guleke).

Symptoms The symptom complex of tetany was first described by Steinheim in 1830 and the name tetany was subsequently suggested by Corvisart. Since then the same clinical picture has been repeatedly noted in association with various conditions of widely different character. The cause of its occurrence in most of these conditions is not understood but as a sequel to thyroid operations tetany has been shown to depend upon deficiency of functioning parathyroid tissue and in consequence has been designated by Erdheim *tetania parathyriopriva*. Halsted suggests the terms *status parathyreoprivus* and *hypoparathyreosis* to designate the condition of the individual suffering from partial or complete loss of parathyroid tissue. The symptom and course have been described in detail by Frank Hochwart.

Tetania or tetany parathyreopriva is characterized by certain striking symptoms which render it practically unmistakable. The most conspicuous of these are intermittent tonic spasms of the voluntary muscles those of the extremities being most affected. A salient feature is the exclusive involvement of the flexor group of muscles. Intercurrent contractures of the facial muscles are relatively rare and the muscles of the chest, back and abdomen participate in exceptional cases only. The tetanic spasms are usually preceded by certain prodromata which persist for a variable period before the onset of the attack. These include headache, sensations of weakness or prostration, more or less rigidity of the limbs, radiating pain and clonic twitchings. The contraction usually begins in the hand and subsequently involve the feet, less often the feet are affected coincidentally or independently. The spasms are almost al-

ways although not invariably symmetrical and bilateral. As a rule two or more of the fingers are flexed and the thumbs are forcibly adducted sometimes tightly clasped by the contracting digits. The most characteristic contraction has been designated *accoucheurs hand* (Trousseau). In 50 per cent of the cases the wrist also becomes flexed while flexion of the forearm with adduction of the arm to the trunk occurs infrequently. Exceptionally the fingers are held wide apart the terminal phalanges alone being flexed. The feet when involved take the position of *pes equinus* or *equinovarus* as a result of contraction of the muscles of the calf. In the contractions of tetany the affected muscles become very hard to the touch and oppose a powerful resistance to attempts at passive relaxation. Should this prove successful the tetanic attitude is at once resumed when the traction diminishes. Fibrillary twitchings are sometimes visible in the contracted muscles.

The onset of an attack is as a rule about one to three days after the operation but this period may be less in rare cases it may be as long as two weeks. The duration of an attack may not exceed a few minutes or the attack may last for a number of hours but it rarely persists as long as forty eight hours. The termination of a tetanic spasm is frequently preceded by symptoms resembling those observed at the onset.

While there may be a free interval of days or weeks between the attacks unfortunately this is far from being the rule. There are generally several attacks in the course of the day the patient's rest at night being unbroken. In the severest cases one attack follows another with alarming rapidity. As a rule consciousness is retained during the attack. In severe cases, extreme dyspnoea may occur.

Besides the attacks of spasms there are other manifestations of the disease. Disturbances of sensation are regularly present especially pain which is a frequent concomitant of the spasms. Hyperaesthesia, paresthesia or anaesthesia may also be noted. Temporary redness and edema are not infrequently observed over the joints. Further the evidences of chronic tetany may develop. These consist chiefly in certain trophic disturbances such as loss of hair, dry skin changes in the nails, teeth and lens also metabolic changes resulting in cachexia. The manifestation of chronic tetany may persist for years.

A certain number of cases too numerous to be interpreted as accidental coincidences present a combination of tetany with typical epileptic

seizures (Guleke cites the cases of Ehrhardt Hoffmann Hochgesand Kocher Kroulein Mikulicz Westphal) These symptoms have sometimes been observed after thyroidectomy in individuals previously free from nervous symptoms and a possible connection between epilepsy and tetany has accordingly been suggested Certain authors also include with the symptoms of tetany the hysterical attacks which are occasionally present (cf Frankl Hochwart)

Trousseau assumes three distinct degrees of tetany based upon the distribution of the paresthesia: first a mild form affecting the peripheral muscles only, some of these attacks even limited to the hands; second a moderate form with involvement of the facial abdominal and trunk muscles; third a severe form extending to the involuntary muscles.

Tests. Of particular significance as bearing on the diagnosis are the tests of Erb Chvostek Trousseau and the leg and arm test. These may be elicited during the free interval or latent period and likewise after the subsidence of the attacks of muscular spasms.

Erb called attention to the fact that electrical hyperexcitability of the motor nerves is regularly present in tetany. There is a marked increase of galvanic irritability especially in the ulnar nerves. One electrode is placed over the nerve just above the internal epicondyle and the other on an indifferent point at a distance as the infraclavicular region. In the case of the external popliteal one electrode is placed over the nerve behind the head of the fibula and the other on the abdomen. Hyperexcitability is evidenced by contraction to abnormally mild stimuli K C A C A O and K O all being very low. The most marked and significant features however are the low A O and K O contractions a cathodal opening contraction below 5 millimperes is particularly significant. Erb's test is undoubtedly the most sensitive reliable and accurate for tetany. It should always be used in a suspected case.

Trousseau's phenomenon can be demonstrated in two-thirds of all cases of tetany. The symptom consists in the occurrence of a tetanic spasm in a limb as the result of compression of its main nerve-trunks. This phenomenon has been shown to depend upon stimulation of the nerves (Frankl Hochwart and Kashida).

Chvostek called attention to the facial phenomenon which can be elicited in tetanic patients by gently tapping over the area of distribution of the facial nerve. The resulting short twitchings are known as *Chvostek's symptom*. This

test is relatively constant sensitive and simple but the duration of the contraction is short and therefore may be difficult to distinguish in doubtful cases.

In the *leg phenomenon* (Beinphänomen) Schlesinger sign (Lool's phenomenon) contractions are caused by putting the sciatic nerve on the stretch. For this test the patient is placed in a sitting position with legs fully extended upon the thighs and the trunk is then forcibly flexed upon the thigh by pressure exerted between the shoulders. The contractions are preceded and accompanied by pain which may be severe enough to cause the patient to cry out. The feet become forcibly flexed (plantar) and adducted assuming a position of marked equinovarus. This position cannot be altered by passive efforts however forcible. The muscles of the calf stand out conspicuously and become board-like to the touch. The onset of the pain and contractions begins from about 40 seconds to two minutes after the position is assumed. The pain may become so severe in a short time as to make it imperative to desist. The leg test, like Trousseau sign, is dependent upon the hyperexcitability of the motor nerves. They differ only as to the method of demonstrating this hyperexcitability. In Trousseau's test the nerve is compressed in the leg test the nerve is stretched.

The *arm test* consists in putting the nerves of the brachial plexus on the stretch by elevating the arm above the head with the forearm extended — extreme abduction. The characteristic contractions of the fingers, hand and wrist occur with pain as in the leg test. It appears less sensitive than Trousseau's sign or the leg test (Irenez Pool Alexander).

Hoffmann's test which depends upon hyperexcitability of the sensory nerves to electrical and mechanical stimuli appears to be of little practical importance.

In the *longue le l* (Zungenphänomen) Schultze a slight blow upon the tongue is said to produce a contraction with the appearance of deep depressions.

The *course of tetany* following thyroidectomy has been divided by Frankl-Hochwart into three classes: (1) cases characterized by onset soon after operation, severe course and fatal outcome; (2) cases in which the symptoms appear soon after the operation but subside after a variable time and are followed by recovery; (3) cases in which the patients live but present the manifestations of chronic tetany. It is necessary to extend this classification thus there may occur latent tetany with no muscular spasms but

with positive Chvostek's phenomena and other kindred signs (von Eiselsberg). Moreover after the spasmodic attacks have ceased recurrences may take place especially under the influence of certain conditions which are practically the same as those with which the onset of idiopathic tetany is associated namely pregnancy lactation cold seasons diet of meat etc (Guleke).

According to Guleke the prognosis of post operative tetany is not good. From the cases which he compiled from the literature 25 per cent died and 17 per cent developed a chronic or markedly recurrent tetany. Iversen in his compilation found the death rate in post operative tetany to be about 17 per cent.

TREATMENT OF TETANUS PARATHYREOPRIVIA

Much experimental work has been done on this important phase of the subject. There is however considerable conflict in the results reported. This is not surprising since the course of the disease in animals is so irregular as to render it extremely difficult to estimate the effect of treatment. Even without treatment some animal which presents profound manifestations of tetany a few hours after operation passes after one or more such attacks into a chronic condition and live for days in contrast to others in which the first attack proves fatal.

Attention was naturally first directed to the administration by mouth of thyroid and parathyroid gland and their products. Gley, Hoffmann, Linn, Levy, Dorn, Vassale, Westphal and many others have reported improvement of the symptoms of tetany in animals likewise in man after feeding thyroid gland or its derivatives. Most observers however disclaim favorable results with exclusive thyroid therapy. Lewenthal and Wiebrecht ascribed the apparent beneficial effects of thyroid feeding to the admixture of parathyroid. In later work he argued that such parathyroid tissue must be in too small amount to exert a material influence.

Parathyroid preparation in various forms likewise have been tested experimentally notably by MacCallum, Halsted, Vassale, Berkley and Beebe also by Biedl, Chvostek, Frank, Hochwart, Mousu, Peppre and Finckel. But it does not appear to have been proved that either mixed thyroid and parathyroid or even pure parathyroid feeding can control the disease in animals.

Administered to animal in subcutaneous injection thyroid gland derivatives have proved inefficient while parathyroid products are said to have met with some success at the hand of

Beebe and others. With the nucleoprotein Beebe claims that amelioration or disappearance of the symptoms is almost constant.

MacCallum reported benefit in parathyroidectomized dogs as the result of intravenous injections of large amounts of prepared parathyroids.

MacCallum and Voegtlin have shown that the manifestations of tetany can be quickly though only temporarily dissipated by injections of calcium. They have shown further that in both normal dogs and those with tetany injections of calcium strontium or magnesium also barium lower the excitability of the nerves. Therapeutically they consider calcium far superior to magnesium on account of the toxic effects of the latter. Strontium closely resembles calcium in effect barium is poisonous. They state that even injections of calcium should not be made subcutaneously because of its irritating and destructive local effects upon the tissues.

In man the effects of treatment are difficult to estimate because of the impressionable character of the patients and the variable course of the disease. Some successes with thyroid feeding have been claimed as stated above. MacCallum, Marneco, Lowenthal and Wiebrecht and many others have reported improvement following the administration of parathyroid preparations by mouth. Yet the results in animals apparently have demonstrated that in the treatment of tetany by parathyroid therapy subcutaneous administration is the mean which offers the best prospect of controlling the disease. Beebe's nucleoprotein at present appears to be the most efficient product for this purpose. It has been employed with encouraging results in about fifteen cases (Beebe personal communication). Amelioration of the symptoms after the administration of calcium lactate has been reported frequently.

Transplantation. In vivo transplantation has occupied an important part in the experimental work in connection with tetany and its peculiar significance as a therapeutic agent in this condition warrant a brief review of the main principles of the subject.

Parenchymatous organ in part or in entirety seem to have been transplanted with some degree of success in a number of cases between animals of the same species and even between human beings but the transplantation of such tissue from an animal to man or experimentally between animals of different species has uniformly failed.

Of parenchymatous transplantsations particular attention has been directed to the thyroid

gland The original experimental transplantations of this organ in animals were done by Schiff and the first attempt in man was made by Kocher in 1883 in a case of cachexia strumipriva. The functional results in both instances were transient only. It was tried by Biercher and others for myxedema but with similar results. The first attempts which seem to have been successful in respect to the life and function of the transplanted thyroid tissue were those of von Eiselsberg and Cristiani. Payr reported striking results in animals and in man.

Many of the experimental thyroid implants apparently resulted in the prevention of tetany. Von Eiselsberg in 1892 transplanted in four cats half of the thyroid into the proper meal tissue and one month later removed the other half; the animal remained healthy until he removed the implanted thyroid after which tetany developed. In the successful thyroid transplantations it may fairly be assumed that parathyroid tissue was present. Confusing result have been reported by Kocher who noted that implantations into the bone-marrow of the tibia of small pieces of thyroid tissue in which no parathyroid tissue could be found microscopically prevented tetany after complete thyroparathyroidectomy and that tetany developed when the implant were removed. Thompson, Lighton and Swartz and Morel found that various bone lesion experimentally produced without an implant likewise prevented the acute evidences of tetany.

Recent experiments of Stich and Kalks appear to suggest the possibility of organ transplantation in entirety with reestablishment of the circulation by vessel suture but this modification has not been sufficiently developed for practical application. The small size of the parathyroids would render it necessary to transplant thyroid with the parathyroids.

Much experimental work has been done with exclusive parathyroid grafts by Camu, 1904; Biedl, Cristiani, Cristiani and Ferrari, Cimorini, von Eiselsberg, Enderlen, Erdheim, Halsted, Leischner, Luena and many others. The reported results vary to an astonishing degree but certain features stand out conspicuously. Halsted found that in order to secure functional success with an autogenous graft a considerable deficiency in parathyroid tissue must have been created. Leischner and Kohler concluded from their transplantations in rat that the beneficial results were due to the action of the graft during its absorption while damaged parathyroid tissue was resuming its function. Cimorini grafted all four parathyroids into the peritoneal cavity of

the same animal; acute tetany did not develop but cachexia later occurred when the grafts became absorbed. Like other observers he found that the peripheral parts of the grafts resist longest the central parts necrosing early.

As to the sites most favorable for implantation opinions differ. The main situations which have been employed are the subcutaneous tissues (Cristiani), peritoneal tissue (von Eiselsberg, Halsted), peritoneal cavity (Cimorini), spleen (Payr), thyroid (Halsted), blood stream (Landow) and bone-marrow (Kocher). In determining the situation for election in a given case attention must be given to the freedom from serious danger which it offers and to its qualifications for maintaining the implanted tissue.

The tissue should be implanted aseptically into a bloodless pocket with a minimum of trauma and exposure to the air. Only a very brief interval may elapse between the excision and implantation and during this interval the viability of the tissue is probably best retained on the basis of the work of Cristiani in connection with the thyroid by preserving the tissue in serum from the same species of animal or in inactivated serum. Apparently Locke's solution also may be employed satisfactorily.

To sum up the experimental results it may be said that an autoplasmic parathyroid graft may be successful morphologically and functionally and possibly may even functionate permanently; that with homoplasmic parathyroid grafts permanent functional results have not been proved.

In man homoplasmic parathyroid implantations have been reported by Boeck and Lorenz, Brown, Czerny, Danielson, von Eiselsberg, Garré, Groves and Joll, Kocher, Morel, Pool and Tumure. In these cases the parathyroids were taken from living individual during the course of other operations except in the cases of Brown and the first case of Pool in which the parathyroids used for implantation were removed immediately after death.

The result in these cases were not conclusive though in several there was a strong probability that the graft proved efficient. Even if the symptoms of tetany disappear in a small number of cases after an implantation has been made the value of the graft is still conjectural only its removal (functional test) which is not justifiable can demonstrate the real effect of the transplantation. Three interpretations are possible if the symptoms subside after parathyroid transplantation. First that the graft exerted no influence. It is possible that the tetany was destined to be self limited and that the parathyroid implanta-

tion happened to precede by a short time the disappearance of the symptoms. Second that the graft may have exerted a temporary effect during its absorption in tiding over a transitory tetany while the injured or devascularized parathyroid were rehabilitating themselves. Third it is possible that the transplanted parathyroid is permanently effective as a functionating graft. Without entering into extensive consideration of tissue-transplantation the parathyroid appears to be a relatively favorable tissue for grafting. Halsted's experiments on dogs indicate that a small autograft if a considerable deficiency in parathyroid tissue has been created is capable of living and preventing tetany. This he proved by the functional test.

As soon as symptoms of tetany are noticed calcium lactate should be administered followed by the parathyroid nucleoprotein as soon as feasible. The calcium must be repeated as indicated the nucleoprotein should be given continuously. Although benefit has been claimed for calcium lactate given by mouth in doses of about 30 gr every four hours intravenous administration appears to be much more efficient. Beebe suggests 20 ccm of a 5 per cent solution with 100 ccm of sodium chloride solution. In a case of gastric tetany Knickerbocker administered intravenously 4 gm in 1000 ccm of salt solution. The nucleoprotein is administered subcutaneously or intramuscularly indefinitely 1 ccm of a one per cent solution being given three times a day (Beebe personal communication).

Parathyroid implantation is indicated when medical treatment seems of no avail or when the symptoms persist for a sufficient period to make it probable that spontaneous cure will not occur.

The method of transplantation is as follows. The parathyroid is carefully dissected out in the course of a goiter operation in an otherwise healthy young patient. The organ is immediately put into Locke solution so as to minimize exposure to the air. The implantation is made with the least possible delay into a peritoneal bloodless pocket previously prepared beneath the rectus abdominis. It appears best to cut the parathyroid without removing it from the solution and to expose two or more raw surfaces. Gurré however advises leaving the parathyroid intact by dissection and the minimum of manipulation and exposure to the air are essential.

In view of the uncertain status of all proposed methods of treatment the importance of prophylaxis is self evident.

Prophylaxis. In operation upon the thyroid gland it has been shown that not merely must

sufficient thyroid be left in order to prevent the occurrence of myxedema but also that the parathyroids must be conserved so as to prevent the occurrence of tetany. Without entering deeply into the operative detail of partial thyroidectomy we will review briefly such features as bear upon the preservation of the parathyroids.

The operator must attempt to leave these bodies *in situ* uninjured and with their blood supply inviolate. Although it appears probable that two parathyroids will prevent the development of tetany care should be exercised to avoid injuring or removing any of these bodies. Even when only one lobe of the thyroid is removed an effort to preserve the parathyroids on that side is indicated first because tetany occasionally has followed unilateral extirpation and second because an operation upon the second lobe may subsequently become necessary therefore if parathyroids have been sacrificed on the side first operated upon a trifling curtailment of the parathyroid secretion upon the second side may readily precipitate tetany.

When we consider how difficult it is to locate the parathyroids at autopsy on account of their small size and variable situation it is evident that under the conditions which prevail at operation their recognition cannot be depended upon and must prove a matter of chance. In order to preserve the parathyroid in the removal of a thyroid lobe one of two procedures should be employed. One method consists in carrying the dissection as close as possible to the true capsule of the thyroid independent small bits of tissue being sought for stripped from the thyroid and left uninjured. By this procedure apparently first suggested by Chantemesse and Marie but particularly emphasized by C. H. Mayo the removal of the lobe is made from within the surgical capsule that is intracapsular the surgical capsule being left. If small bits of tissue suggestive of parathyroid are removed they should be implanted at once into the remaining thyroid tissue or into some other appropriate part of the operative field (Halsted von Eiselsberg). The other method which is even safer consists in leaving the posterior part of the thyroid lobe in relation to which two parathyroids usually lie. The posterior part of at least one lobe always should be left. As has been emphasized the removal of both lateral lobes in one or several operations leaving the isthmus only is a dangerous procedure leaving only the upper poles dangerous also.

In order to preserve the blood supply of the parathyroid three methods have been advocated

and employed First the branches of the inferior thyroid may be clamped as they enter the gland—ultra ligation (Halsted) Second the main trunk may be ligated well outside of the surgical capsule that is, a considerable distance from the probable site of the inferior parathyroid It is claimed for this procedure that anastomotic channels are not interrupted (Kocher de Quervain) In these methods care should be taken to avoid including in a ligature or clamp the inferior parathyroid which frequently lies in close relation to the inferior thyroid artery Third the posterior part of the lobe may be left and the branches of the inferior thyroid artery secured in the cut thyroid tissue This has been recommended as the safest procedure (cf Iversen) and may be employed advantageously on at least one side

OTHER VARIETIES OF TETANY

Attempts to ascribe the etiology of all forms of tetany and even of certain allied diseases such as epilepsy and paralysis agitans to an imperfect functional activity of the parathyroid glands have not been successful as a rule Nevertheless Pineles assumes the existence of a common etiology for all forms of tetany He inclines to the belief that further research will trace the unopposed action of a tetanic toxin in all forms of tetany to a depressed functional state of the parathyroid Chvostek also expresses the view that all varieties of tetany are dependent upon the parathyroid bodies His observations of tetany apart from that following goiter operations led him to believe that the essential feature in the etiology is a functional disturbance of the parathyroid glands so that they are unable to adapt themselves to various changes It is due to this susceptible condition he and others think that menstruation pregnancy infectious diseases etc are prone to produce the tetany reaction

In connection with tetany of maternity there have been findings suggestive of parathyroid insufficiency Von Eiselsberg Neumann and von Meinert reported cases of maternal tetany in women who had undergone partial thyroidectomy Moreover Adler and Thaler Erdheim Halsted Verstraeten and Vanderlinden and others have found in animal a tendency to develop maternal tetany after parathyroid deficiency has been artificially produced As Iversen states, tetany is more severe in gravid than in non gravid animals if it has not developed immediately after the operation it is apt to do so at the close of an ensuing pregnancy

The tetany of childhood has been attributed by many authorities to deficiency of functioning parathyroid tissue chiefly by reason of the fact that hemorrhage into the parathyroid gland has been reported among others by Erdheim Fischer and Yanagawa others however have failed to find such a lesion (Jørgensen Grosse and Betke Auerbach etc) Guleke reviews the subject with extensive references and concludes that there is no proof that tetany of childhood is dependent upon a pathological condition of the parathyroid bodies

Gastric tetany and idiopathic tetany likewise have not been shown to be dependent upon the parathyroid glands yet in a case of idiopathic tetany Garre implanted a human parathyroid with reported beneficial results In a case of gastric tetany Kinnicutt found the parathyroid bodies of normal structure

The special pathology of the parathyroids may be summarized from Guleke as follows

Atrophy of the parathyroids has been reported by various authors Thompson in marasmus, Habersfeld in typhus pneumonia congenital syphilis etc

Hypertrophy in cases of osteomalacia has been reported by Erdheim and others Cotoni considers it a regular occurrence in pregnancy

Degeneration both hyaline and amyloid has been noted

Hemorrhage into the parathyroid has been reported quite often especially in children The fact that it has been found not infrequently in the tetany of children (cf supra) has led to the unproved assumption that it plays a causal rôle

Acute infections appear to influence the parathyroids little if at all (Trauma Garnier) Acute inflammation of the parathyroid has been found rarely on the other hand the parathyroid are frequently affected in syphilis and tuberculosis

Cysts of the parathyroid have been divided according to their origin into retention the most common variety degenerative and those caused by embryological disturbances

Tumors epitheliomata of the parathyroid have been reported by Walther and Oliver and Aguerre but Guleke and de Quervain question the parathyroid origin of these growths

Idenomata have been reported by Erdheim MacCallum Petersson von Verbeek and Weichselbaum and others

Parasitoma (Langhans) according to Guleke constitutes the most important group of new growths of the parathyroid The tumors may occur in the usual situations of the normal parathyroids that is close to but external to the

thyroid (Berard and Alamartine) or within the thyroid (Berard and Alamartine Benjamins Hul t) or at a distance from the thyroid for instance in the mediastinum or carotid region (Fiori Kocher Makai de Quervain) Microscopically the tumor is suggestive of parathyroid tissue being composed of irregular cell masses separated by connective-tissue septa The cells frequently contain glycogen Guleke estimates the reported cases as about forty The tumor tends to invade adjacent structures and to give rise to metastases (Kocher Langhans)

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advantages over other methods of radical treatment. Since anatomical continuity is not actually destroyed and the motor nucleus is not directly affected, conditions are most favorable for recovery of motor function while sensation would be permanently lost if the ganglion were completely destroyed. Thus by allowing sufficient time for regeneration in the motor root, bilateral ganglionolysis might be safely practiced.

9. Clinical observations have been too recent to furnish reliable information as to the permanency of relief after ganglionic injections, and experimental studies appear to indicate that it is not probable that the ganglion can be completely destroyed by a single injection of alcohol. It is the author's opinion, however, that by repeated injections of the ganglion its complete destruction may finally be accomplished. *GROGAN F. BRIDEN*

Kakels M. S. Hemorrhage from Middle Meningeal Artery Due to Traumatism. Hemiplegia. Motor Aphasia. Osteoplastic Flap for Ligation of Vessel. Recovery. *Am J S* 5 1915 xxix 16
By Surg. Gynec. & Obst.

Kakels claims that fortunately the physical signs, the effects of cerebral compression, are so characteristic that they hardly admit of error. An injury to the skull sufficient to cause laceration and extravasation is generally followed by a peculiar sequence of symptoms depending upon the situation of this extravasation. The extravasation may be either intracerebral or extracerebral; if the former death may follow rapidly before symptoms of compression are demonstrable, due no doubt to involvement of important centers. If extracerebral, due to bleeding from the middle meningeal or its branches, the following characteristic symptoms are usually present: (1) concussion, (2) free or conscious interval, (3) focal symptoms, and (4) symptoms indicative of general pressure.

Bleeding from the veins, sinuses, perisinoidal sinuses, or emissary veins may cause extradural hemorrhage; the symptoms depending upon the amount and site of the extravasated blood.

Stress is laid upon the importance of the free or conscious interval between the concussion and the compression stages as a characteristic symptom of middle meningeal hemorrhage. Coma may appear very rapidly due to rapid extravasation.

The author recommends the use of a large osteoplastic flap with its center over the main trunk of the artery to obviate the uncertainty which often arises as to which branch has been injured. And again with this exposure the brain can be lifted and the middle fossa of the skull exposed and the clots removed.

He cites the following very interesting case. A male aged 45 was struck with a baseball. At first he felt dizzy but was soon able to walk home. One hour later he became unconscious and the whole right half of the body including the face was completely paralyzed. On examination a small hematoma

over the left frontal region was discovered but no depression could be made out. The left pupil was dilated and there was no reaction to light or accommodation. The right upper and lower extremities were paralyzed. The knee jerk, Babinski's sign, and ankle clonus were present on the right side.

On the left side the knee jerk was present but only a slight ankle-clonus could be elicited. Lumbar puncture revealed sanguinous cerebrospinal fluid. The pulse was slow and irregular, blood pressure 220 mm. A large horseshoe incision was made in the left temporal region down to the bone, four trephine openings were connected with a Gigli saw and the osteoplastic flap was dislocated downward. A large clot the size of the palm and an inch thick, was removed, a marked depression being noticed on the cerebrum when this clot was removed. The bleeding was found to be coming from the main trunk and this was ligated. A fissure fracture of the temporal bone was found close to the base of the skull. No subdural hemorrhage was present, the brain was then gently lifted and a number of clots were removed from the base of the skull. The space was then gently packed with iodoform gauze to arrest the bleeding and the osteoplastic flap was replaced and loosely sutured.

In forty-eight hours under narcosis the old incision was laid open, the osteoplastic flap again reflected, the pack removed and a soft rubber drain inserted and made to protrude from one of the trephine openings. The osteoplastic flap was then permanently sutured. The drain was removed on the seventh day. During the operation the blood pressure fell to 120 mm.

The motor aphasia and hemiplegia gradually disappeared and at the end of two weeks were hardly noticed.

The author claims that the prospects of relief from hemiplegia due to epidural hemorrhage are in direct relation to the time elapsing from the traumatism to the operative interference.

LEWIS B. CHAFFORD

Csérnyi K. Diseases of the Hypophysis and Functional Diagnosis of Polyglandular Diseases. (Über Hypophysenerkrankungen zugleich einige Beiträge zu funktioneller Diagnostik der polyglandulären Erkrankungen.) *Deutsche Arch. f. Klin. Med.* 914 cx 45 By 5 rg Gynec. & Obst.

Csérnyi describes in detail three cases of acromegaly and two of dystrophia adiposo-genitalis. In one of the cases of acromegaly there was an adenoma of the glandular part of the hypophysis, the histological structure of which corresponded to the normal structure of the hypophysis. Among the other glands of internal secretion there were marked pathological changes in the thyroid, thymus, and ovaries.

In one of the cases of dystrophia adiposo-genitalis there was an adenoma of the anterior part of the hypophysis which showed an elective tendency to propagation and whose structure was completely

different from that of the normal hypophysis. The direct cause of the disease was degeneration of the pedicle of the hypophysis. The thymus, the parathyroids and the ovaries showed pathological changes.

The cause of hypophyseal diabetes insipidus is hypofunction of the pars intermedia. This is shown by the fact that in one case injection of pituitrin caused a fall of 40 per cent in the daily output of urine and also by the fact which has not been sufficiently emphasized that diabetes insipidus is often combined with dystrophia adiposo genitalis. In all of the five cases there was leucopenia with relative mononucleosis. In one of the cases of acromegaly there was also marked eosinophilia. In the first and second cases of acromegaly the carbohydrate tolerance was very much decreased. In the other case of acromegaly and the two of dystrophia adiposo genitalis it was normal or increased.

The author suggests two new methods for functional diagnosis in diseases of the polyglandular system. (1) The adrenalin and pituitrin reaction of the conjunctiva. Under normal conditions three drops of a 1:1000 adrenalin solution cause a slight or moderate decrease in the conjunctival reaction that lasts for 10 to 20 minutes. If when the solution is instilled the reaction is increased it indicates hypofunction of the chromaffin system. (2) A study of the quantitative and qualitative blood changes after adrenalin injection. Adrenalin injected subcutaneously in a normal individual causes leucocytosis with increase of neutrophils and a decrease in the number of eosinophils and mononuclears. If there is any variation from this effect it indicates disease of the polyglandular system. A Goss

NECK

Payr E. Thyroid Transplantation (Zur Frage der Schilddrüsen-implantation). *Arch f kl Ch* 104: 41-6. By S. R. Gynec. & Obst.

Even though the previously published reports seem to indicate that a large part if not all of the transplanted thyroid is absorbed, Payr thinks the procedure should not be given up but that further work should be devoted to making it more effective. One means of so doing is to make a sharper distinction between congenital and acquired forms of hypothyroidism. The outlook in the latter is much better than in the former for it is much easier to strengthen an impaired function than to produce a substitute for a non-existent one. Moreover a sharper distinction should be made between the various forms of idiocy in childhood cases caused by hypothyroidism has sometimes been confused with those caused by encephalitis, porencephaly, meningitis, hydrocephalus, congenital syphilis of the brain, infantile and mongoloid degeneration. Natural history could be helped by thyroid medication or transplantation in the latter class of cases.

In congenital myxedema as well as in cretinism

there are marked changes in the brain such as asymmetry of the hemispheres, smallness of certain lobes especially the frontal and temporal changes in the convolutions or even sometimes complete absence of certain convolutions, inflammatory sclerosis of the brain substance and dilatation of the ventricles. Of course substitution therapy even if it improves the bodily condition cannot make up for intellectual deficiency produced by such changes as these. The thyroid has an important influence in the development of the central nervous system. Therefore the earlier the development of the thyroid defect the greater the changes in the central nervous system and the earlier the treatment the more completely such changes can be avoided.

Early diagnosis and treatment is of the utmost importance. A closer study should be made of the biological relations of the individuals concerned. It is better for the donor to be a member of the immediate family of the patient. Naturally a donor must be chosen who is not suffering from hypothyroidism in fact it is probably better to choose thyrotoxic goiters for transplantation as their excess of thyroid secretion makes them more effective than normal thyroids. As a large part of the transplant is absorbed it is better to transplant large quantities. Palpation is not sufficient to show the condition of the thyroid so it is better to make a small exploratory incision and examine it directly. This does no harm even to small children and the same incision may be utilized for transplantation. Various locations have been chosen for the transplants such as the spleen, bone marrow, thymus and the subcutaneous fatty tissue. The spleen offers the advantage of being very vascular and thus affording abundant nutrition to the subcutaneous tissue that of being easily accessible and not rendering a serious operation necessary.

Payr has performed seven transplantations in the past eight years and he thinks that transplantation is fully justified from the fact that it often succeeds at least for a considerable time where thyroid medication has been unsatisfactory. In one of his cases the effect persisted for two and one half years and he thinks that this shows that there was something more than the mere effect of the gradual absorption of the thyroid tissue.

The effect of transplantation is much more powerful and much more rapid than that of thyroid medication. Probably more of the products of internal secretion can be utilized in transplantation than in simple thyroid medication. A Goss

Kocher T. Transplantation of the Thyroid (Über die Bedingungen, folgender Schilddrüsen-implantation beim Menschen). *Arch f kl Ch* 94: 49-83. By S. R. Gynec. & Obst.

Kocher gives a very thorough discussion of the question of thyroid transplantation. He has transplanted the thyroid in 93 cases, in 57 of which he has had later reports. 18 were reported as un-

successful and 18 as successful but they had continued under thyroid treatment thus leaves 21 successful cases with no other form of treatment. The case histories of these 21 are given.

Transplantation is successful in cases of hypothyroidism its chief indication is in myxedema and cachexia strumipriva. That it has not been successful as a general rule in cretinism is explained by Kocher as being due to the fact that chemically and biologically cretins resemble some of the lower animals rather than man and therefore in the chemical biological sense transplantation of the human thyroid is heteroplastic not homoplastic. Cretins should be given a long course of thyroid treatment before transplantation is done in order to overcome these biochemical differences.

The thyroid must be transplanted into vascular tissue the spleen or bone marrow or it may be transplanted subcutaneously. Kocher has generally transplanted it into bone marrow. A living and active or hyperactive thyroid must be chosen. A part of an exophthalmic goiter is excellent for the gland is hyperactive. One large piece or a number of small pieces may be transplanted. If the thyroid hunger of the patient is too great the transplanted gland will undergo degeneration in extreme cases thyroid extract should be given to prevent this. The thyroid must be transplanted immediately after its removal so that two skilled surgeons are required one to remove and one to insert the thyroid. The most absolute asepsis is necessary.

In many cases there is permanent improvement in the condition thus showing that the operation is more than a simple subcutaneous administration of thyroid extract. He does not decide whether this is due to the implant taking and functioning permanently or whether it merely stimulates remnants of the original thyroid to renewed activity.

A. Goss

Beebe S. P. The Serum Treatment of Hyperthyroidism. J. 1st M. 1914, 9, 514, 43.

By S. R. G. C. Y. N. & O. H. A.

The function of the thyroid gland is to prepare an active substance or hormone which is essential to the organism.

Under physiologic conditions this hormone finds its way into the circulation to meet the normal needs of the tissues. The control of this absorption is at least in part a function of the nervous system. When the gland becomes overactive its secreting cells multiply its circulation increases the store of reserve material is overdrawn by the circulation and a train of symptoms known as hyperthyroidism results.

To a small degree the disease may really be regarded as a toxemia and the source of it is to be found in the excess of thyroid secretion in the circulation.

The thyroidal origin of the symptoms of the disease is the basis of the serum treatment. The following observations point to the conclusion

that the thyroid gland is the source of disturbance (1) enlargement of the gland (2) increased blood supply in gland (3) histologically marked evidence of an increase in the total amount of secreting epithelium (4) symptoms of the disease can be imitated by giving to normal persons large amounts of thyroid preparation (5) removal of the gland or diminution of its blood supply surgically relieves the condition and (6) many observations show that these patients are in most cases more than usually sensitive to thyroid administrations.

The purpose of the serum treatment is to prepare in an alien species of animals a serum having special antagonistic properties to the human thyroid secretion. The injection of the serum provides the patient with a ready antagonist to the complex toxic substance in circulation. Because of the experiments of Pearce, the author reviews the method of preparation of the immune serum by injection of the nucleoprotein published in 1905. Absolute specificity under all conditions has never been demonstrated but it is possible to make a serum which will act primarily on a given organ. In spite of many experiments with nucleoprotein serums the original method of preparing the same has been followed except that blood free organs have been used and the prepared proteins have been preserved for injection by freezing rather than by chloroform or drying.

The author tells Pearce's method destroyed the biologic character of the protein. A large percentage of animals fail to produce a highly active serum of four sheep only one produced an active serum. The author's conclusion is that it is more difficult to form than the globulins and albumin antibodies.

Beebe's conclusion as to evidence of specificity is based on precipitation agglutination absorption experiments and on the effect of animal injections.

In the preparation of the serum human thyroid must be used because of the biologic specificity of the protein.

General precautions as to dose and frequency of injections are given. The dose varies with the clinical condition. As a rule the first injection is borne well without local or systemic reaction. It is best to begin with one third ccm and observe its reaction before increasing the dose. The best site of injection is midway between the elbow and shoulder on the anterior aspect of the arm and into the subcutaneous areolar tissue. Immediately after injection hot compresses are applied for one hour then a 50 per cent alcohol dressing is applied. If local reaction is negative or very slight a second injection is given the next day in the other arm dose 7 to 8 minims. If conditions are favorable third injection is given on the third day 10 to 12 minims in the first arm followed by 1 ccm every second day unless there is a reaction. If the reaction is severe it is better to wait a couple of days and then begin with a smaller dose. It is not wise to repeat injection until the previous

Kocher A: Basedow's Disease and the Thyroid
(Über Basedowsche Krankheit und Thyroid)
I ch f kl Ch 914 c q 4
By Surg Cyneec. & Obst

Kocher finds that in Basedow's disease there is always hyperplasia of the thyroid but that there is hyperplasia of the thyroid in only about 45 to 50 per cent of the cases. Hyperplasia of the thyroid is much more frequent in young patients with Basedow's disease than in older cases. The age when hyperplasia of the thyroid is most frequent does not coincide with that when disease of the thyroid is most frequent. In most of the cases the hyperplasia of the thyroid is only moderate in degree. There may be as great an increase in the size of the thyroid without Basedow's disease.

Itologically there is no difference between juvenile hyperplasia of the thyroid and that of Basedow's disease. Hyperplasia of the thyroid is more frequent in certain regions and in certain families. In most cases the hyperplasia of the thyroid existed before the Basedow's disease developed and so could not be the direct cause of the latter condition. It is apt to increase after the development of the Basedow's disease. The cause may be a hypoplasia of the adrenal cortex.

If cases of Basedow's disease with hyperplasia of the thyroid are treated by simple extirpation or partial extirpation of the thyroid the thyroid generally retrogrades. The thyroid operation is not any more dangerous in these cases than in those in which there is no change in the thyroid. Treatment with thyroid preparation and roentgen rays may be given before the thyroid operation but the results are only transitory. This treatment should be given shortly before the operation. A. Goss.

Asch R: Lingual Goiter with a Discussion of Myxedema and Postoperative Tetany (Die Zunge struma glühend und auch Beitrag zum Myxödem der Lunge der postoperativen Tetanie) Deut k Zt f Ch 94 503
By Surg Cyneec. & Obst

Asch removed a small tumor from the base of the tongue of a healthy woman of 28 who had first noticed it two weeks before. It caused no disturbance except some interference with breathing as she lay in bed. What seemed to be the thyroid gland could be palpated deep in the neck so no danger was anticipated from the removal of this tumor even if it proved to be an accessory thyroid gland. The microscope showed that it was made up of both thyroid and parathyroid tissue.

The patient felt well for two weeks and then developed postoperative tetany and myxedema in a pronounced form, and by the end of six months she presented typical cachexia thyroprivia and parathyroprivia. She failed to take the thyroid treatment that had been advised but the disturbances gradually subsided spontaneously. At present four years since the operation there are no symptoms except a slight myxedematous condition.

The literature on lingual goiter is reviewed with a bibliography of 133 titles. Among the 95 cases on record are 35 in which signs of thyroid insufficiency had been noticed before the operation (21) or autopsy (14). Only 12 per cent of the total cases were in males.

These tumors are always on the median line of the tongue. In one case iodine treatment caused the tumor to increase in size while the general health suffered. Palpation of the thyroid region is not always very reliable and in Asch's case had probably given misleading findings. In 9 per cent of the total 95 cases myxedema followed removal of the lingual goiter. In case of doubt it is better not to remove the whole tumor. In 4 cases another operation was required later in a few other cases the tumor returned but subsided spontaneously later. A. Goss.

Mienböck R: Stimulating Effect of Röntgen Treatment in Goiter and Basedow's Disease (Über Röntgenwirkung bei Röntgenbehandlung von Struma und Basedowschen Krankheit) Fortsch r d Leb d R 1919 1913 51
By Surg Cyneec. & Obst

After radiotherapy of simple goiter patients often have more or less severe general or local symptoms. Mienböck thinks these are due to an initial stimulating effect of the roentgen rays on the parenchyma of the gland. This causes hyperemia and swelling of the organ, increase of cell activity and general symptoms of thyrotoxicism. This is generally only an initial stage of stimulation which is soon followed by regenerative processes. The symptoms of thyroidism persist only in exceptional cases on such cases is described. Mienböck thinks it probable that in this case there was a focus predisposed to Basedow's disease somewhere in the body either in another ductless gland or in the nervous system so that the stimulation of the thyroid and increase of its internal secretion sufficed to provoke the disease. It is well known that several organs are involved in the production of Basedow's disease.

All goiters should be treated with roentgen rays, even large cervical and substernal ones especially if there is stridor and difficulty in breathing. Treatment should be cautious at first—small doses and irradiation of individual lobes on different days—in order to avoid severe symptoms of thyrotoxicism. After a few weeks the danger is passed and a more energetic method should be used. Roentgen treatment is also indicated in all recurrences after strumectomy.

Cases of permanent Basedow's disease after roentgen treatment are so rare as not to furnish a contra-indication for the treatment.

In Basedow's disease also the symptoms are at first increased by roentgen treatment. The treatment should be begun carefully, the individual region of the neck being irradiated at intervals of two days and the dose should be much less than the

maximum. One or two weeks should elapse before the next irradiation is given.

Kienbock concludes that roentgen therapy should be given in all cases of Basedow's disease even those that are so severe as to demand operation eventually.

The preliminary roentgen treatment improves the general condition of the patient and therefore makes the prognosis better on operation. Nagelschmidt expresses the same opinion. Cases of recurrences should be given roentgen treatment. A. Goss.

SURGERY OF THE CHEST

CHEST WALL AND BREAST

Poynton F J and Davies H M. Clavicle Dysostosis in Which the Removal of the Outer Part of the Imperfect Right Clavicle Relieved Severe Symptoms from Pressure on the Brachial Plexus. *Proc Roy Soc Med* 1914 11 Sect D's Child 21. By Surg Gynec & Obst.

The authors report the case of a girl aged 20 years whose work as a dressmaker had been interfered with by severe shooting pains down the inner side of the arm and over the front of the chest. There was marked loss of power in the right hand and much circulatory disturbance. When the shoulder was depressed the right pulse was diminished in volume a sign which assisted in the exclusion of syringomyelia a condition which has been described in association with this form of dysostosis.

The outer fragment of the clavicle was removed and when the patient left the hospital there was already improvement. She has been completely free of the severe neuralgic pains her hand has recovered power and she has resumed her occupation. The only complaint now is a dull ache in both shoulders brought on by the long hours during which she sits at her work in a position that tends to make the shoulders over stoop. This is relieved by sitting up with the shoulders braced back and is of an entirely different nature from the former trouble which is caused by the inner end of the outer fragment of the right clavicle pressing back on the nerves. L. W. L. & Co.

W. H. M. and Ehrlich. Artificial Pneumothorax (Über künstliche Pneumothorax). *I. I. H. d. G. b. d. R. o. g. i. o. v. e. 518*. By Surg Gynec & Obst.

Since July 1911 W. H. M. and Ehrlich have performed pneumothorax in 44 cases. In 11 by Brauer's incision method and in 33 by Lohmann's puncture method. They are inclined to think that the latter is preferable. The operation with the triple rubber pressure not more than 3 mm mercury in a few minutes was high 10 to 15 mm. Such high pressure was used only in 4 cases where adhesion had to be freed. The initial loss of nitrogen was generally 400 to 600 mm for the purpose of producing rapid teleresis of the lung and loosening adhesions. In 11 cases of relapsing symptoms due to pressure on the heart and mediastinum with these doses. The later losses were 400 to 500 ccm and less. They sometimes get total amounts as high as 2300 ccm when of course more or less

absorption of nitrogen had taken place between the treatments. The intervals between injections were at first 2 to 4 days and later as long as 28 days.

The average time for the entire treatment was a year. It is better to maintain pneumothorax too long than to give it up too soon. The authors do not think it is justifiable to discharge patients after 4 to 5 months.

In general the indications are as given by the older authors in severe chronic unilateral tuberculosis. But it is seldom that the opposite lung is absolutely free from tuberculous foci. If these are small and quiescent pneumothorax is not contra-indicated. The effects are not very favorable in cases with cavities. It is contra-indicated if such pronounced adhesions are present as to make extensive pneumothorax impossible. This however can generally be determined only by trying. It is very important to keep the patients under roentgen observation to determine the effects of insufflation, the degree of retraction of the lung and the degree of displacement of the heart and mediastinum.

Histories of a number of the authors' cases are given. Of the 45 cases 4 were clinically cured, 9 greatly improved, 3 considerably improved, 5 withdrew from treatment. In 6 cases successful pneumothorax was impossible on account of adhesions, 6 grew worse and 11 died.

They do not agree with those enthusiastic authors who believe that pneumothorax is indicated in the great majority of cases of pulmonary tuberculosis but they think the method is justified as they attained improvement or cure in a number of severe cases that would have been hopeless by other methods. The method has thus far been used only in very severe cases and the operation is slight. They believe it should be extended to more recent cases in which it will give better results. A. Goss.

PHARYNX AND ESOPHAGUS

Chamberlin W. B. Removal of an Open Safety Pin from the Esophagus Under Suspension. *La. g. p. o. s. x. 8*. By Surg Gynec & Obst.

The author reports a case of a baby aged 11 months with an open safety pin point up at the upper end of the esophagus. Under general anesthesia with the child suspended the pin was removed by grasping the head with a forceps in the left hand and rotating the pin by means of a

second forceps in the right hand thus demonstrating the advantage of having both hands free for manipulation
 LILL J PATRICK

Moore J L: Epithelioma of the Esophagus
Proc Roy Soc Med 1914 11 *La Jngol* 5 11 8
 By SURG CYNE & OBST

This patient a male aged 50 was shown to illustrate the benefits of Hill's feeding tube. The patient had had dysphagia for two months and when

first seen on September 18th had lost 37 pounds in weight. Solid or semisolid food swallowed was soon vomited. He could only retain liquid food. There was a large secretion of mucus day and night of which he vomited a cupful at a time. At the time of writing the tube had remained in situ for seven weeks and food was retained. He could swallow liquids without discomfort. He was relieved of the mucous secretion and his general condition was much improved.
 Otto V. Rott

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Mantelli G. Results of Plastic Repair of Inguinal Hernias with the Sartorius Muscle (Italian)
Monatsschrift für Chirurgie 1914 42 11
 1014 21 20 3 By SURG CYNE & OBST

The author calls attention to this most excellent method of repair in recurring hernias published by him in 1910 and in a new report the results obtained. He has employed this method especially in hernias that had recurred after operation with the several well known methods and has had not a single recurrence.

The method of operation is as follows. An incision is made over the inguinal canal in the usual manner. This is lightly extended to the anterior superior spine of the ilium and at the acute angle of the inguinal canal the incision is carried down over the course of the sartorius muscle for about fifteen centimeters. The sartorius is completely divided at its middle third leaving intact its posterior aponeurotic sheath. It is turned thus into the inguinal canal and sutured to the outer border of the rectus abdominis muscle and to the crural arch the sutures including Poupart's ligament.
 A. A. LAKE TA

Davis J D & Diaphragmatic Hernia Report of Five Cases
J Surg 1914 11 3 4 5
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second day and from the thorax on the fourth day. The patient made a good recovery.

The fourth case was received at the Davis Infirmary with the history of having been cut in the left chest and in the right side of the abdomen during a fight. After receiving the cuts the man continued to fight until he fell exhausted. He was taken to the infirmary two hours later and placed on the operating table. A wound was found in left chest between the seventh and eighth ribs near the posterior axillary line and a stab wound in the abdomen just above the umbilicus on the right side. An incision was made through the seventh intercostal space for exploration and the stomach was found in the pleural cavity. The incision was increased to about six inches and the seventh and eighth ribs were cut in front and behind. Retraction of the wound gave a good view of the stomach which was carefully examined and replaced. The incision in the diaphragm about two inches long was closed with No. 2 catgut sutures. The chest was closed with interrupted wormgut sutures without drainage. The patient was then turned on his back and the abdomen opened through the right rectus extending two inches above and one inch below the umbilicus. A cut was found in the transverse colon and a little blood in the abdomen. The cut in the transverse colon was closed with a double row of continuous Lembert silk sutures and the blood mopped out with moist gauze sponges. The abdomen was closed with tier catgut sutures. The patient did well until the sixth day when he had a chill and his temperature ran up to 104, pulse 120. A suture was cut in the posterior portion of the chest wound and a pair of forceps introduced and opened when a lot of bloody serum flowed out. A small rubber drainage tube was introduced and left for a week. The fever continued for five days when it disappeared and the patient recovered.

The fifth case was a male of medium size who entered the Hillman Hospital December 9, 1914 with two cuts in the chest. One stab was received to the left of the nipple between the fifth and sixth ribs and another through the eighth rib on a line with the inferior angle of the scapula. Through the second wound a portion of omentum was protruding. One of the internes after cleansing the chest with iodine tied off the omentum and reduced it mopped the wound with iodine then picked the wound with iodoform gauze and covered both wounds with sterile dressing. Three days later the patient was prepared for operation for the author clinic. He was placed on his right side and either the eighth rib was resected making a flap with the base above according to Cranwell's method. The diaphragm had been opened two and one half inches through which incision a large portion of omentum and a section of colon had protruded. The omentum and the colon were reduced and the opening in the diaphragm was closed with No. 2 catgut sutures. A small cigarette drain was placed in the lower angle of the wound and the chest closed with

buried catgut sutures except the skin which was closed with interrupted wormgut sutures. Had the patient been operated on the first day he arrived in the hospital the abdomen would have been opened as a precaution for possible visceral injury. But three days later he had no evidence of abdominal injury the abdomen was relaxed. He had been eating a regular diet and so it was concluded that he had sustained no injury to any of the abdominal viscera. On December 21, 1914, the patient was up and around the hospital. Recovery seemed certain. When an operation is decided upon the question arises as to which is the best route to follow. If the abdominal route is selected it is not at all easy to reach the wounded diaphragm. Prolonged and difficult maneuvers are required to bring the wound into view if it should be found necessary to enlarge the opening the task will prove difficult of accomplishment by way of the abdomen and it will be found exceedingly difficult by this route to apply sutures to the diaphragm.

The thoracic route presents great advantages. It has one decided merit in injuries of the chest viz that the external wound itself serves as a guide. The chest is to be opened at the site of this wound and the course of the wound followed. Further this is the most direct route it affords space for reducing the hernia if one is found to exist and for enlarging the diaphragmatic wound and treating the hernia. There are two objections to thoracicotomy. The first is danger of pneumothorax. The second objection is that the route does not permit exploration of the peritoneum and its contents. This objection is valid in regard to those cases in which it is necessary to repair injuries and remove intestinal contents and blood from the peritoneal cavity. In the cases in which it is important to ascertain what viscera if any has been wounded an abdominal section is necessary.

No hard and fast rules are to be made for surgical procedures each case should be approached according to its individual features but from observations of the author the superiority of the transpleural route in the treatment of thoracic-abdominal wounds seems to be indisputably established. A regular technique is difficult to establish because of the great variations of the wound. The author recommends as a rule Cranwell's trap door opening with the base above. He believes however, that resection of one rib is often sufficient and that the incision seldom needs to extend above the eighth rib in front or the seventh behind.

GASTRO-INTESTINAL TRACT

Chrenreich M. Diagnosis of Secretory Inactivity of the Stomach in Its Early Stages
(Zur Diagnose der beginnenden sekretorischen Insuffizienz des Magens). Berl. M. W. 1914, 94 h 346. By Surg. Gyne. & Obst.

There has been a great deal of discussion as to the presence or absence of free hydrochloric acid

in the stomach contents in carcinoma of the stomach. However the real question at issue is not the presence or absence of acid but the condition of the secretory function of the stomach. Carcinoma inhibits the secretory activity of the stomach while in benign conditions such as ulcer this activity is rather increased. The absence of acid occurs only at a late stage while to be effective the differential diagnosis must be made at an early stage.

As a method of making this diagnosis of secretory insufficiency early Threnreich suggests that the acidity of the residue in the fasting stomach be determined and compared with the acidity after a test breakfast. In ulcer the acidity is as high or higher in the breakfast as in the residue while the opposite is true in cancer. When a test breakfast is given on a stomach from which the residue has just been removed the stomach has already been stimulated by the residue and is tired if there is any decrease in function as there is in carcinoma it will manifest itself under such conditions and the acidity of the breakfast will be lowered the opposite will be true in ulcer where there is a tendency to oversecretion.

Tables are given showing the comparative values in the two conditions noted. Operation in several cases confirmed the findings shown in the tables. The amount of the residue influences the results, and they have been found most accurate where the amount of the residue was practically the same as that of the breakfast. A Gow.

Alberts G. Operative Treatment of Acute Hemorrhage of the Stomach (Ein Beitrag u operativen Behandlung der akuten Magenblutungen). *Deutsche Zeitschrift für Chirurgie* 914 1915 303. By Surg. Gynec. & Obst.

In 1887 Mikulicz first proposed operation for acute hemorrhage of the stomach and as excision of the ulcer was impossible he cauterized the floor of the ulcer. Since then various methods of operation for this condition have been tried not always with very great success. Alberts reports a case in which he operated by ligating the arteries of the greater and lesser curvatures in some cases this was combined with gastro-enterostomy to relieve the stomach. Two of the patients who were in a very grave condition from loss of blood before the operation died. One had a recurrence of hemorrhage afterwards. The results were good in the other three cases.

It has been shown by animal experiments that there is no danger of necrosis of the part of the stomach from which the blood supply is cut off. As most patients have bled severely before operation the whole mortality should not be attributed to the operation. Chronic hemorrhage may be arrested by gastro-enterostomy jejunostomy is also sometimes performed. Both of these operations are easy to perform but neither guarantee hemostasis. Ligature combined with jejunostomy is best for

threatening acute cases and if it were performed earlier the mortality would be less. A Gow.

Doolin W. Experiments in the Transplantation of Gastric Mucous Membrane *Surg. Gynec. & Obst.* 1915 2 53. By Surg. Gynec. & Obst.

The author has carried out various experiments in confirmation and extension of Ashbaen's researches upon this subject. Ashbaen has shown that autoplasmic transplantation within the abdominal cavity produces cyst formation the cyst wall being lined with cuticular epithelium. Doolin has succeeded in demonstrating that this cyst lining has its definite origin in certain epithelial islets which have survived the general necrosis of the transplanted material. The survival of these islets is due to early adherence of the omentum around the site of implantation the blood-vessels of the omentum carrying the requisite nutrition. The size of the cyst formed varies directly with the length of time which has elapsed since the operation.

Other surroundings such as the soft subcutaneous tissues proved not to have the same powers of nutrition as the omentum for the sensitive mucosal grafts and in a series of experiments undertaken to test the feasibility of forming tubular grafts the mucosa did not survive. In conclusion the author states his belief that tubular grafts of hollow abdominal mucosal tissue such as Lexer's implantation of an appendix for stricture of the urethra depend for their success upon the maintenance of their lumen by the muscularis with a later lining of the canal with epithelium pouring in from the surroundings.

Carman R. D. Some Elementary Features of the X-Ray Diagnosis of Gastric Carcinoma, Gastric and Duodenal Ulcer *Canad. Med. Assoc. J.* 9 5 16. By Surg. Gynec. & Obst.

Carman observes that the radiologic manifestations of gastro-intestinal pathology have various and fluctuating values some are pathognomonic, others strongly indicative and still others merely suggestive. Three varieties of stomach are encountered the normal the reflex and the pathologic. Distinction of the pathologic from the normal is not very difficult but distinction of the pathologic from the reflex is often troublesome. The author's technique is a combined fluoroscopic and skiagraphic examination with a double opaque meal the first meal being given six hours in advance of the examination to determine the gastric motility.

The abnormal stomach manifests itself by alteration of form contour motility peristalsis mobility tone and position. The chief sign of gastric cancer is the filling defect a permanent irregularity of contour which must be differentiated from deformity caused by a gas-filled colon extrinsic tumor spasm. Other signs of cancer are the gaping pylorus of non-obstructive cases stenosis with 12 hour residue in the obstructive cases generally diminished peristalsis absence of peristalsis.

sis from involved areas lessened mobility and lessened flexibility of the stomach. Syphilis and other benign tumors may produce similar signs. The cardinal signs of gastric ulcer are the niche of penetrating ulcer and the accessory pocket of perforating ulcer either of which represent the ulcer excavation as visualized by the opaque meal. Other signs are the incisura — a local constriction in the plane of the ulcer — hour glass stomach residue in the stomach after six hours localized pressure tender point at the site of the ulcer acute fish hook form of the stomach with displacement to the left or downward lessened mobility and hypotonus.

The manifestations of duodenal ulcer include hyperperistalsis with or without six hour retention accessory pocket of a perforating ulcer hypermotility hypertonus deformity of the bulbous duodeni pressure tender point over the duodenum and reflex gastrospasm producing hour glass constriction or transient incisura.

Haudek: Ultimate Results in Two Hundred and Fifty Operative and Non Operative Cases of Deep Ulcer of the Body of the Stomach (Über die weiteren Successale Operationen und die Operationen für tiefe Magengeschwüre). *Deutsche Medizinische Wochenschrift*, 1904, 30, 4.

On the basis of his immediate and late examinations for the past four years the author found that in all cases that he had diagnosed as chronic crater shaped ulcer of the fundus of the stomach by means of the niche appearing in the roentgen picture there were frequent recurrences and periodically appearing symptoms in the cases treated internally so that in general he thinks operation is indicated. This opinion is supported by the dangers which threaten in this disease such as hemorrhage gradual loss of strength malignant degeneration in 35 per cent of the cases but he does not hold that the indication for operation is unconditional for on one hand there are cases with relatively mild course slight symptoms and long intervals free of any symptoms while on the other hand the results of the simplest stomach operation gastroenterostomy are not always favorable on account of the high position of the ulcer.

Of 66 patients on whom gastroenterostomy was performed 8 died 5 of them because the primary disease was already too far advanced in 6 cases the symptoms recurred and in 20 cases the persistence or return of the niche indicated a continuance of the primary disease in spite of the fact that the gastroenterostomy functioned well. Six were operated upon again. Of 10 cases examined later in 1909 and 1910 there were 10 recurrences so it is to be feared that in the future there will be a still further decrease in the 6 cured cases.

Of 3 cases resected by the Billroth II method 8 were cured 2 improved and 3 died a short time

after the operation. Of 6 jejunostomies 3 cases which were in a very bad condition when operated on died 1 case remained well 2 cases recurred and one of these was cured afterward by a transverse resection. Of 4 plastic operations 3 recurred and the other case has not been heard from. Two gastrotomies also recurred and one of two gastroenterostomies. Of 17 transverse resections 14 were cured 1 improved 2 died.

The roentgen findings in transverse resection of the stomach are typical there is a short contracted stomach with unusually quick emptying through the open pylorus. The author thinks this is a favorable factor in prognosis as it prevents the collection of acid stomach secretion with its bad consequences. Transverse resection is technically difficult but the results are excellent. The surgeon can judge of the degree of severity of the radical operation from the roentgen picture it becomes more difficult with increase in size high position and involution of the niche.

VON HABERER Innsbruck like Perthes advocates radical operation in ulcer of the stomach he resects an ulcer of the fundus and also of the pylorus. In ulcer at a distance from the pylorus he has become an absolute advocate of resection because of the unsatisfactory results in simple gastroenterostomy reported by Clairmont in von Iselberg's material. Von Haberer reports 83 resections for ulcer with 75 recoveries and 8 deaths. The late results are good. A great deal has been said about recurrence of ulcer even after resection. Von Haberer doubts whether these are always true recurrences. He believes that more frequently than has been thought there has been a second ulcer that was overlooked on operation. If for example an ulcer of the pylorus has been extirpated by the Billroth II method, and a second one has been left on the lesser curvature after resection of the pylorus the same condition is present as after simple gastroenterostomy in an ulcer at a distance from the pylorus. In such patients the symptoms may persist. Among 83 cases von Haberer had 15 of multiple ulcers that is in 18 per cent of the cases. He succeeded in finding these ulcers by palpation they had often caused no change in the serosa. He was guided by the condition of the glands. He found that in the neighborhood of the ulcer on one of the curvatures of the stomach glands could always be felt and that sometimes they were somewhat reddened. If the part of the stomach in which these glands were found was palpated the depressions of the ulcers could often be felt. If the pylorus is markedly stenosed it is very easy to overlook an ulcer high up on the lesser curvature as in these cases there is apt to be a large sacular stomach so that the second ulcer even if it has penetrated may not show in the roentgen picture for such sacular stomachs cannot be entirely filled with bismuth. Von Haberer showed a specimen of such a one obtained on operation. The whole stomach should be carefully examined and then better results may be expected.

FURPMANN Berlin has performed 128 transverse resections for ulcer of the stomach and in two of them a carcinoma has appeared 1 year after the operation.

CLAIRMONT Vienna has had 146 good results in 30 gastro-enterostomies that is, 48 per cent. Gastro-enterostomy is effective only in ulcer of the pylorus in ulcer at a distance from the pylorus resection is to be preferred. *h. v. v. v.*

Melchior F.: The So-Called Arterio-mesenteric Occlusion of the Duodenum (*Über den sog. Arterio-mesenterischen Duodenal-Obstr.*)
Berl. kl. Wch. sh. 1914, 1915, 1916
By S. R. C. and C. H. C.

The commonly accepted theory has been that the abdominal organ were held in place by ligaments—suspended in the abdominal cavity. That this is not true is shown by the structure of the mesentery which contains no tendon fibers. Moreover, it is absurd to suppose that the falciform ligament could sustain the heavy filled stomach.

The organs of the abdomen really either sit or rest on the organs below, these in turn being supported by the pelvic floor and the pressure of the abdominal walls. In accordance with the old theory duodenal ileus or arterio-mesenteric occlusion of the duodenum is caused by the duodenum sinking down on account of relaxation of its support and becoming occluded by the root of the mesentery. But sufficient traction on the mesentery to produce such occlusion would cause the most intense and unbearable pain as the sensitivity of the mesentery is well known; moreover, it would cause interference with the mesenteric circulation leading to thrombosis and gangrene. Neither of these two conditions occurs. As a matter of fact, this so-called duodenal ileus is due to dilatation of the stomach and the upper part of the duodenum in contrast with which the lower part of the duodenum appears constricted. Actual dilatation does not take place unless the stomach is filled with fluid or gas, but there is an atony of the musculature that will be followed by dilatation if peristalsis is not taken to prevent it, therefore Melchior proposes to call the condition acute gastroduodenal atony. It should be avoided by care during operation, especially with the anæsthetic, avoidance of manipulation of the stomach during operation, caution in giving fluid is after operation and irrigation of the stomach if atony of atony develops.

The failure of the urgent procedures undertaken for the cure of the condition under the old theory should be sufficient to disprove it. The right treatment is not to select the correct surgical procedure, but to diagnose it early enough to avoid the necessity of any operation. *A. G. C.*

Reder F.: Intestinal Anastomosis. *Lancet*
94, 1916. By S. R. C. and C. H. C.

The author reviews the history of intestinal anastomosis and intestinal suture from 1730 up to

the present time and notes that no part of abdominal surgery has undergone more radical changes than intestinal suture and that in no other department of surgery is the contrast greater than that between the ancient and modern methods of intestinal suture. He calls attention to the fact that the knots are often tied too tightly thus inviting disaster and another method of equal importance is the placing of the stitches. Stitches should be introduced sufficiently close to render the line of suture impermeable to gases and fluids and should be about an eighth of an inch apart. The amount of tissue included in each stitch and the extent of inversion of the wound margins must be accurately determined. A diagram of sufficient size be formed to act as a partial obstruction enough of the serous surfaces however must be brought in contact to insure good adhesion.

In discussing whether the suture should be continuous or interrupted, Reder thinks that from the analysis of the worth of these two sutures, it can readily be inferred that a serous continuous suture supported by an inner continuous one including all coats will be the one of choice. The argument rather favors the double row suture method for it must be appreciated that an inner stitch invariably secures good and sufficient approximation, a firm apposition and acts perfectly in controlling the bleeding from the cut edges of the gut. These facts coupled with the added safety of an inner suture give assurances that weigh heavily with the conscientious surgeon.

Considering the material best suited for intestinal suture, he states that nothing so far has taken the place of the fine silk or linen advocated by Pagenstecher.

The technical method of intestinal anastomosis involves two important principles—simplicity and safety. The general trend of surgical opinion is strongly toward the view that simple suture is the most desirable method for employment in intestinal anastomosis. The reason for this is that possibly the trained operator who is able to perform an anastomosis almost as rapidly with the suture as with a mechanical device has found that these appliances are unnecessary and furthermore he feels that he is free from the risk of leaving anything behind that might cause dangerous results and even death when his work is finished. The axiom of successful intestinal suturing, peritoneum to peritoneum established by Lembert holds good today.

Under the heading of Artificial Aids the author emphasizes that intestinal surgery is not free from surprises and that occasionally conditions are encountered where it would be an undoubted convenience to use certain artificial aids. Prominent amongst these devices are the decalcified bone plates of Senn, the decalcified bone-bobbin of Mayo Robson with modifications by Alvingham and Hayes, The potato bobbin of C. Hey and the soap-bobbin of Reder may well be classed among these aids.

These bobbins are simple and safe and can be adapted to any of the operations on the intestinal canal. After the bowel ends have been sutured over the bobbin the aid is left to its fate in the canal. It is usually safely dissolved or passed.

He also mentions that the rubber cylinder possesses the advantage that in an incongruence of the bowel ends into which it was inserted it made their coaptation less difficult thus facilitating the introduction of the sutures. Tension upon the intestinal wall could be readily controlled and the removal of the bulb after the suture was nearly completed could be easily accomplished by deflation. The bulb's greatest disadvantage was the short life of the rubber.

The Murphy button is spoken of as a mechanical device introduced into the lumen of the bowel and utilized as a substitute for sutures. In the words of the author this button has exercised a more potent influence in the free application of intestinal surgery than any individual invention. It enjoys a distinction of its own and is one of the many devices which has successfully weathered all sorts of attacks from all angles. The button is a most valuable device and almost indispensable in intestinal surgery. The author's experience with it left no regrets, and the greatest compliment he can pay the Murphy button is his statement that he feels more at ease when he sees it upon the tray with the instruments for an abdominal operation. The Murphy button possesses undoubted merit of a high degree. The great saving of time in its application is appreciated because it lessens shock. As a subjugating means against infection and in the lessening of post-operative paralysis it has repeatedly demonstrated its great value.

The author states that intestinal anastomosis may be accomplished by one of three methods: (1) axial or end to end union; (2) lateral anastomosis with closure of the cut end of the bowel; and (3) lateral implantation or end to side union.

The selection of one of these methods is a matter of judgment with the surgeon. He must be guided by the condition as they present themselves and as he recognizes them. His experience in this particular field of work, the most delicate and exacting in surgery, will dictate to him as to the best method to use.

If the condition of the patient permits preference should be given to the double row suture method, i.e., an inner suture reinforced by a continuous outer one with a Shoemaker mesenteric stitch.

If the condition of the patient is judged to be only fairly good a single suture, the continuous Connell with the Lee mesenteric stitch, would be the suture chosen.

If the condition be such that the operation must be completed speedily and if the operator feels a lack of faith in his skill, it would be well for him to make use of the Murphy button.

The author states that if he were asked what method he would prefer in effecting a bowel junction

either end-to-end or lateral, his reply would be that in a healthy bowel—gunshot or stab wounds—he would use the end-to-end union, whereas in a diseased bowel—gangrenous bowel or malignant disease—he would have recourse to the lateral method as it is absolutely necessary to maintain as good a blood supply as is possible where an excision of a diseased bowel is to be undertaken. Such a blood supply can be best maintained with a lateral anastomosis because the incision for the purpose of communication is made in the terminal twigs of the blood supply and at a distance from the divided mesenteric trunks.

The author's allusion to the method of lateral implantation is brief. The technique of an end-to-side union he has found invariably more difficult to execute than that of any other method. It seems to him that the procedure possesses one serious drawback, i.e., the liability of the opening contracting. To obviate this it would become necessary to enlarge the bowel openings either by an incision or a partial excision of the intestinal wall. This would create a so-called fatal suture angle, one well to avoid in intestinal surgery if at all possible.

Lateral implantation seems to have a working field in colocolostomy and ileocolostomy and in some cases of enteric exclusion. In his work of partial gastrectomies Kocher gives laudable expression to this method.

The anastomosis can be effected either with the single or two row suture or as is frequently the case with the Murphy button.

Reeder fails to see the advantage that a lateral implantation might possess over a lateral anastomosis. It seems to him that in it are embodied all the difficult steps of the other methods.

ARTHUR B. EUSTACE

Palmer W. W. The Absorption of Protein and Fat after the Resection of One Half of the Small Intestine. *Am J Med Sci* 914, cxlviii 856.
By Surg. Gynec. & Obst.

Palmer reports certain absorption observations obtained from a woman aged 40, from whom 235 cm of intestines were removed by Codman. In June 1913 the first operation was done for many tuberculous ulcers of the small intestine, lower one-third a jejunocolostomy was done to relieve this condition but owing to a distressing diarrhoea and abdominal cramps in August a second operation was performed in which the lower half of the small intestines and the ascending colon was resected, making in all 235 cm. A lateral anastomosis between the small intestine and the colon was made and the immediate recovery was good. She was then referred to Palmer who carried out an extensive absorption experiment. At first on a low fat diet she improved and was allowed to go home but she soon developed numbness and peculiar drawing sensations in the legs, forearm and face. This was recognized as a condition of

tetany Chvostek's Trousseau's and Erb's phenomena were all well marked

A second absorption experiment together with a study of the calcium metabolism was carried out. After the institution of a low fat diet and the use of calcium there was a marked and rapid improvement and soon the Chvostek and Trousseau phenomena could not be elicited and the electrical reactions were normal. This improvement continued for three months when she gradually lost weight, and suddenly the tetany returned again upon the administration of the calcium the tetany disappeared in three days.

The stools showed little change in gross appearance but microscopically there was present more neutral fat than on any previous examination. For the next three months she made no progress vomiting continued and the tetany symptoms were present in varying degrees most of the time. Trousseau's sign was easily elicited. In the upper abdomen directly above the umbilicus a sausage shaped tumor could be felt and another one under the scapula of the previous operation. A third absorption experiment was carried out and without apparent cause she became mildly delirious had ideas of persecution and insisted on being taken home. The urine at no time showed albumin sugar acetone or diacetic acid.

Palmer describes minutely the methods and diet used by him in his experiments. The diet used in periods 1 and 2 consisted of eggs bread sugar butter and milk accurately weighed and the nitrogen and fat was computed from the tables of Atwater and Bryant.

In period 3 the food was analyzed for nitrogen fat and calcium. The food mixture was the one employed by Folin.

In 61 Flint gathered all the cases in which 200 cm or more of intestine had been resected. 59 cases in all. Denker removed 540 cm (21 ft 3 in) of the small intestine from a woman 61 years of age and he reports good recovery with no intestinal disturbances. It is claimed that in dogs one half of the intestines can be removed without seriously affecting growth or metabolism, even as much as 75 per cent of the intestine has been removed with recovery but the dog usually dies of inanition due to uncontrollable diarrhea.

In man the condition of the intestine is of the utmost importance and should receive careful consideration when ever extensive resection is contemplated. Palmer insists that the greater the certainty of leaving nothing but healthy intestine the more frequently may extensive resection be successfully undertaken. He warns against resecting more than one half of the small intestine in man. In man as in animals fat absorption is most disturbed nitrogen less interfered with and the carbohydrates are nearly always absorbed in a normal manner.

It is interesting to observe the calcium metabolism in this case normally calcium is excreted by

the bowel and during tetany following parathyroidectomy there is a marked loss of calcium from the body. The remarkable improvements in this patient's condition proves its importance in this tetany.

Palmer's conclusions are

1 Absorption studies after resection of the lower half of the small intestine are reported.

2 The loss of nitrogen in the stools is from four to five times that of normal individuals.

3 The loss in fat in the stools is five to six times the normal loss.

4 A high urinary indican, 800 mgs is reported.

5 Ammonia forms a much larger part of the urinary nitrogen than in normal individuals.

6 The success with which larger portions of the intestines may be removed depends to a large degree on the condition of the intestine remaining.

7 A diet low in fat and moderately low in protein should be given in cases where extensive resections are undertaken.

LEWIS B. CRAWFORD

Hell, Physiology of the Appendix (Zur Physiologie des Blinddarmes) *Deutsche Gesellschaft für Chirurgie* 94

By Zentralblatt für Chirurgie Grenzgeb.

The author reports experiments designed to explain the physiological functions of the appendix. There are two factors to be investigated: the internal secretory activity of the mucous membrane of the appendix and the position and innervation of the appendix with reference to the valve of Bauhin.

1 The internal secretion of the mucous membrane of the appendix consists of digestive ferments, an albumin splitting trypsin and a carbohydrate splitting ferment; there are also hormones which, when injected intravenously into rabbits cause marked peristalsis, the movement being isoperistaltic. These internal secretions are analogous to those demonstrated in the same way by the author in the mucous membrane of the caecum. These activities confirm the previous conception of the appendix namely that it is similar to the wall of the caecum not only in its microscopic anatomy but also in its functional secretions. The ferments and hormones in the appendix are very abundant in quantity thus the author thinks is due to the fact that the chief agent in the internal secretion is lymphoid tissue which is known to be especially abundantly developed in the appendix.

2 The relations to Bauhin's valve are as follows. The appendix represents the termination of the longitudinal musculature of the caecum. The posterior longitudinal band passes over from the appendix into a circular muscle. The ileocolic muscle passes circularly around the end of the small intestine where it opens into the caecum and when it contracts closes the end of the small intestine through a segment of the mucous membrane of the small intestine that projects into the end of the caecum over the circular muscle and which on

counterpressure from the cæcum acts as a valve and strengthens the resistance to fluid or air flowing backward from the cæcum. The most important factor in this occlusion is the ileocolic muscle. This muscle is innervated from branches of the splanchnic which accompany the superior mesenteric artery and anastomose with fibers that run to the appendix through the mesenterium of the appendix.

In 30 laparotomies the author demonstrated the following facts. Normally the muscle flap absolutely prevents retrograde movement of fluid or gas from the cæcum into the small intestine. In 1 to 2 per cent of cases the flap allows retrograde movement. The muscle flap is always found open in those cases in which the mesenterium of the appendix shows a demituous infiltration as the result of inflammation as for example after acute appendicitis. Then the contents of the closed off end of the cæcum can be pushed back into the small intestine without resistance. The same thing is rendered possible when the nerves of the mesenterium up to the entrance of the small intestine are interrupted with novocaine.

The author assumes that the action of the ileocolic muscle is related to the contract on of the longitudinal band of the cæcum in the manner of antiperistalsis and that the internal secretions of the appendix have stimulating and inhibitory effect on the tonus of the ileocolic muscle.

Conditions of abnormal tone or insufficiency of the valve of Bauhin according to the author deserve more study. Clinical symptoms which are often regarded as the result of cæcum mobile or chronic appendicitis may be due to insufficiency or a convulsive condition of the muscle flap. He had two patients in whom colic like pain in the ileo-cæcal region were fully or come by appendectomy and tightening of the ileocolic muscle in the manner of a pyloroplasty operation. K. T. Z. 1911

B. Schöff C. W. Th. Bastedo's sign in the Differential Diagnosis of Chronic Appendicitis (Z. Differ. u. Diagn. des Appendicitis chron.)
W. i. k. f. G. b. i. k. G. n. k. 94 1305
By S. R. Gynec. & Obst.

Attention is called to Bastedo's method which consists in the use of the colon to be employed the arduous differential point between chronic appendicitis and right ileocecal fistulae. The uterine appendage with palpable reference to the uterine abdominal organ is to be known from operation. If the appendix is not palpable pain is experienced about McBurney's point which is absent if the right pelvic region is released. In the latter case only a sense of fullness is perceived. The author used this method prior to laparotomy in 3 cases in which the uterus was in 23 cases the least to sign present and in 11 of these the appendix was affected in some way while in the remaining 14 cases where the sign was not obtained no changes were found in the organ. In 6 cases the right uterus did as is known to be in inflammation at least but none of these gave the

Bastedo sign thus appendix involvement was excluded which was verified during the operation.

In 3 cases a marked pyosalpinx with even five intestinal adhesions was present. None of these cases gave the Bastedo sign and the appendix was found to be normal. In a number of these cases where the appendix was found to be normal there had been a previous history of pain in McBurney's region. The author calls attention to the good services Bastedo's method has rendered in the differential diagnosis between severe neuralgia and appendicitis.

Rost in 1912 stated that the Bastedo sign was present also in diseases of the colon. Further that the appendix would respond only if it was bound down to the cæcum by changes in its mesenterium. The author found that the sign was present in a number of cases in which the mesenterium showed no changes whatever. Rost demanded at that time also that the validity of Bastedo's method be proved by applying it to patients whose appendices had been removed. This the author did in a number of his cases which responded previous to operation and he could not obtain the symptom in any of them.

L. A. F. 1912

Wolkowitch N. M.: The Muscle Symptom in Chronic Appendicitis (Das Muselsymptom bei chronischer Appendicitis) R. k. f. 1914 1160
By Zentralbl. f. d. ges. Chir. Cren. 1911

The author called attention in 1911 to a symptom which he called the muscle symptom that he could always demonstrate in the intervals of chronic appendicitis. Diagnosis based on this symptom was frequently confirmed on operation. In contrast with the condition in acute appendicitis where the muscles of the ileo-cæcal region are tense and have a greater tonus than those of the left side he could always demonstrate that in chronic appendicitis the opposite was true the musculature on the right is more flaccid and less voluminous than on the left. This difference in tonus can be perceived clearly on palpation with the hand especially if care is taken to avoid any irritation before the palpation such as deep palpation with the fingers.

The author has made test on fifty patients with the help of Exner's and Taubler's tonometer and in all cases confirmed the finding on palpation. To be sure the tonometer however only slightly differs on the right and left from fraction of a degree up to 5 degrees. He explains this by the fact that the fat layer and still more the organs of the abdominal cavity increase the readings of the tonometer. He cannot say at present whether the symptom is present in other diseases of the abdominal cavity or whether it has also a differential diagnosis.

In conclusion he points out that this symptom frequently coincides with ecchosis of the paracolic umbo to the right and left of the thorax among them Mayet and Delapacher have previously pointed out the connection between chronic appendicitis and left ecchosis of the paracolic umbo. L. A. F. 1912

Opitz: Causes of Appendicitis (Über die Ursachen der Wurmfortsatzentzündung) *Deut. che. Gesellsch. f. Ch.* 1914
By Zentralbl. f. d. ges. Chir. u. Grenzgeb.

On the basis of observations made in gynecological laparotomies the author reports the frequency of adhesions of the cæcum sigmoid and appendix. Among 160 cases which remained from a much larger material after excluding those in which the information was insufficient there were only 14 cases in which the cæcum appendix and sigmoid were all free of adhesions. In all the others there were peritoneal adhesions varying greatly in degree.

The appendix was free of adhesions in 76 cases, the cæcum in 36 and the sigmoid in 20. The nature of the adhesions must be regarded as chiefly inflammatory. Congenital peritoneal adhesions did not appear in more than 20 per cent of the cases while in the material of the Gießen gynecological clinic there were adhesions in 90 per cent of the cases. From this Opitz draws the conclusion that the large intestine especially the ascending colon cæcum and sigmoid is much more frequently diseased than the appendix. But microscopic examination of 100 so called stolon appendices showed that the appendix presented signs of past inflammation of mild or severe degree in a much higher percentage of cases than would be supposed from the external appearance of the appendix. Of 99 appendices only 20 were entirely or approximately normal. 43 showed marked signs of old changes rather mild in degree while 3 showed pronounced signs of severe phlegmonous or ulcerous processes although the history showed no previous attack of appendicitis. From these facts the author draws the following conclusions:

1. Diseases of the large intestine in the form of typhlocolitis sigmoiditis etc. are much more frequent than diseases of the appendix.

2. Diseases of the appendix are caused for the most part by preceding diseases of the colon.

3. The transmission of the disease takes place as Aschoff has shown not by an extension of the inflammation from the wall of the cæcum to the wall of the appendix but by infectious intestinal contents penetrating the appendix and being held there for some time. In this the chemical composition of the intestinal contents seems more important than its bacterial content. Nervous disturbances are also involved either directly from irritation of the vegetative nerves by adhesions or by absorption of toxins, causing circulatory disturbances in the appendix.

The author leaves unsettled the question of how far cæcum mobile and related conditions are responsible for the origin of diseases of the large intestine, but he agrees with Klose Eastman and others that in the treatment of diseases of the appendix it is not sufficient to make a small incision and remove the appendix but a large enough incision should be made to examine the surrounding parts.

KATZENSTEIN

Aschoff L.: Do Worms Especially Oxyuris, Cause Appendicitis Directly or Indirectly (Sind die Würmer besonders die Oxyuren direkt oder indirekt schuld an der Appendicitis)? *Berl. klin. Wchnsch.* 9 4 11 504. By Surg. Gynec. & Obst.

It has long been known that the appendix is frequently infested with oxyuris and Aschoff several years ago described a condition of pseudo appendicitis caused by these worms. Rhendorf has claimed that they are responsible for true appendicitis with destruction of tissue. From the examination of a vast amount of material Aschoff cannot confirm this finding and concludes that they do not cause true appendicitis either directly or indirectly. However greater attention should be given to infection with these worms, especially in children for they cause attacks of pseudo appendicitis which frequently cause the children to be subjected to unnecessary operation. A. Goss.

Périsse M. and Boyet J.: New Method of Distinguishing the Acute from the Non-Acute Stage in Appendicitis or Salpingitis (Nouveau procédé pour reconnaître si une appendicite ou une salpingite est ou n'est pas rétrograde). *Rev. inter. d'obst. et de g.* 9 4 227 64.
By Zentralbl. f. d. ges. Chir. u. Grenzgeb.

The authors maintain that the appearance of acetic acid in the urine is a sure sign of fresh inflammation in the appendix or tubes. With the appearance of fresh inflammation acetic acid appears in the urine; the lack of it shows reliably the retrogression of the inflammation. PÉRISSE.

Duffy R.: Pituitary Extract in Post-Operative Intestinal Stasis. *N. Y. M. J.* 1915 11, 72.
By Surg. Gynec. & Obst.

The author quotes extensively from authors who speak very favorably of the use of pituitary extract in post-operative intestinal stasis. In many cases in which it was impossible to get a bowel movement or to promote flatus after operation by any of the ordinary means an injection or two of pituitrin brought rapid relief. Incidentally it was advantageously used in cases of shock and of difficulty in micturition.

He cites ten of his own cases in four of which it was used only after other measures had failed and in six it was given as a routine measure six, twelve and eighteen hours after operation. In the former group the results were uniformly good; in the latter group a favorable result was noted in 11 but on one case.

The author's conclusions are as follows:

1. Pituitary extract is an important aid in post-operative paralytic ileus.

2. It should be tried in all cases in which purgatives are not retained by mouth.

3. Its effect on the peristalsis in cases with tympanites seems to be more marked than in cases with no intestinal distention.

ALFRED H. NOBLE

Delatour H B Perilant Embryonal Type of Large Intestine *Am Surg J* 1915 41 73
Bj Srg Gynec & Obst

Failure of rotation of the large intestine either partial or complete is occasionally encountered in adult life. Acute abdominal conditions occurring under such circumstances may easily be incorrectly diagnosed. Of the more common forms of embryonal type is a high right sided position of the cæcum. Appendicitis in such cases especially in the adult may be mistaken for acute cholecystitis. Delatour relates such a case in which a gangrenous appendix was successfully removed. This represents an arrest of rotation of the large intestine at about the fourth month of intra uterine life. He quotes Smith as finding this condition 63 times in 1050 autopsies on infants under 3 months of age. He himself has observed 9 adults with undescended cæcums. The condition is sufficiently common in children, he believes to indicate a higher incision for appendicitis than in adults.

Another case in an adult illustrates an earlier period of arrest. The signs and symptoms indicated an acute condition in the left upper quadrant. Operation disclosed an appendix abscess to the left of the spine with the appendix adherent over the left kidney. The cæcum was high with a very short ascending and transverse colon. A third case in a youth of 19 with signs and symptoms indicating acute inflammation in the left lower quadrant was correctly diagnosed as left sided appendicitis. The cæcum was found in the left iliac fossa with the ascending colon passing directly upward to the left of the spine parallel to the descending colon. Subsequent bismuth examination showed some gastropnoia with the duodenum directed in a straight course to the right the small intestine occupying the right half of the abdomen and the large intestine the left side as noted at operation.

The author states that the discovery of the small intestine uncovered by omentum or large bowel through an incision on the right side should lead one to suspect nonrotation of the large intestine.

T W HAMMER

LIVER, PANCREAS AND SPLEEN

Einhorn M Direct Examination of the Duodenal Contents and Bile as a Means of Diagnosis in Diseases of the Gall Bladder and Pancreas (*Die direkte Untersuchung des Duodenalinhalt u d d Gallganges und des Pankreas*) *Berl Wchchr* 1914 54 1 843

Bj Srg Gynec & Obst

Frequently the typical picture is not present in gall bladder disease and the diagnosis of pancreatic disease has always been difficult. Einhorn advises the direct examination of the contents of the duodenum for the presence of fermenting. The contents can be obtained by apiration. If nothing is obtained after 5 to 10 minutes aspiration secretion can be given subcutaneously and apiration per-

formed again in 3 to 5 minutes or duodenal irrigation may be resorted to. His results in 24 cases are given in the form of a table.

The macroscopic appearance of the bile is of importance. If it is golden yellow and clear the gall bladder is generally normal. If it is greenish yellow and turbid it indicates gall bladder disease usually stones. Golden yellow bile with mucus is often found in catarrhal jaundice. Occasionally a clear golden yellow bile is found even when there are stones. Duodenal contents which contains both bile and pancreatic juice makes it possible to test for pancreatic function. If all three pancreatic ferments are present it indicates normal function. If one of them is absent it indicates chronic pancreatitis. There may be a tumor of the pancreas even if all three ferments are present. The tumor may have left enough healthy tissue uninvolved to carry on the function of the organ. This condition is sometimes met with in other organs as the stomach and kidney. Duodenal contents that contains neither bile nor pancreatic secretion indicates an obstruction just above Vater's ampulla. In all the cases given in the table operation or later clinical evidence confirmed the diagnosis made from the contents of the duodenum. A Goss

Aoyama T Experimental Study of Cholelithiasis (*Experimenteller Beitrag zur Frage der Cholelithiasis*) *Deutsche Ztschr f Chir* 1914 133 4 334
By Surg Gynec & Obst

Aoyama performed a series of experiments on rabbits and guinea pigs from which he draws the following conclusions. If the cystic duct is ligated in normal rabbits and guinea pigs peculiarly formed elements are produced in the gall bladder. It is questionable whether these formations have anything to do with true stone formation. Among 14 such experiments on rabbits a concretum similar to a pure cholesterol stone was formed once. To explain this fact we must assume an anomaly in metabolism a cholesterol diathesis. If we inject cholesterol or its fatty acid esters subcutaneously into rabbits or guinea pigs and then ligate the cystic duct bodies similar to pure cholesterol stones are precipitated from the bile in the bladder. This process takes place without the action of bacteria. This shows beyond doubt that cholesterol stones may form aseptically.

The giving of cholesterol or its fatty acid esters by the mouth lead to the same results as above. This shows that a diet rich in cholesterol must be avoided especially in those predisposed to cholelithiasis. Congestion is a factor that plays a part in the formation of cholesterol stones. The gall bladder has a certain amount of active influence in the formation of stones. The results of these experiments explain to a certain extent the difference in frequency of gall stones in different countries. Pure cholesterol stones are not necessarily produced by a process of metamorphosis. They may exist in that form from the beginning. A Goss

Nemiloff A. A.: Experiments in Free Transplantation of the Pancreas (*Versuche freier Pankreas-transplantation*). *Dissertation St Petersburg* 914
By Zentralbibl d ges Chir u Grenzgeb

From an exhaustive study of the literature the author comes to the conclusion that in addition to its external secretion the pancreas also has an internal secretion that is probably due to the islands of Langerhans. The aim of this work was to determine whether it was possible by homologous transplantation of the pancreas to compensate for the internal secretion of the diseased gland and in this way find a means of overcoming diabetes.

The author operated on 84 dogs and performed 67 transplantations in which he avoided auto-digestion of the transplant by previous ligation of the excretory duct thus producing a certain degree of atrophy or by using the pancreas of newborn dogs. For the sake of comparison some experimental autotransplantations and transplantations of normal pancreatic tissue were done. The disc-shaped pieces of tissue 1 to 2 cm in diameter were transplanted for the most part subcutaneously some of them into the great omentum some of them into the mesentery and in two cases subserosally into the small intestine. The animals were killed after periods varying from 24 hours to five months and 20 days they were killed by injection of chloroform into the heart. In the course of the first two weeks the transplant could still be found as such later it could be found only microscopically. The histories of all the experiments are given in detail.

The author's study and experiments led him to the following conclusions:

1. Pancreatic tissue transplanted either auto or homoplasticly subcutaneously or intra-abdominally is for the most part absorbed in the course of a few days and is transformed in a short time into structureless ruins.

2. A thin zone of living parenchyma remains only at the edge of the transplant and this is more pronounced in autoplasmic experiments.

3. In the tissues surrounding the transplant there are first signs of inflammation with hemorrhagic exudate then granulation tissue is formed and transformed into cicatricial tissue which finally replaces the transplant as it is absorbed. In this process the remaining zone of parenchyma finally disappears more quickly in homoplastic than in autoplasmic transplants.

4. The islands of Langerhans are rarely found in the transplant and they also undergo secondary atrophy and destruction.

5. No signs of regeneration were ever found.

6. The longest interval after which remnants of parenchyma were still found was 14 days the process of cicatrization was finished in the third week.

7. The cicatricial tissue at the point of transplantation gradually underwent fatty degeneration and was absorbed.

Stroussberg

Kreuter: Experimental Study of the Effect of Extirpation of the Spleen on the Peripheral Blood Picture (Experimentelle Untersuchungen über den Einfluss der Splenektomie auf das periphere Blutbild). *Arch f kl n Chir* 194 C 191
B Surg GJ ex & Obst.

The reports of blood counts after extirpation of the spleen have varied greatly. Kreuter undertook a series of experiments on rhesus monkeys as the morphology of their blood is very similar to that of man. From his experiments he comes to the conclusion that it is highly improbable that the loss of the spleen in the normal individual has any appreciable effect on the peripheral blood picture and the hematopoietic system. Tables are given showing the blood count in his monkeys before and after the operation.

1 Goss

MISCELLANEOUS

Connell F G: The Chronic Abdomen: A Review of Nineteen Cases of Pericolicitis and Ileal Knot In Which the Appendix Had Been Previously Removed. *Surg Gynec & Obst* 914 112 124
By Surg Gynec & Obst.

The acute abdomen calls for mortality tables the chronic abdomen calls for morbidity tables. The latter is characterized by abdominal pain intestinal disturbance constipation and general symptoms, auto intoxication or subinfection. Among the latter the symptoms called "nervous" are strikingly prominent and constant and their relation to the main abdominal complaint calls for elucidation on the part of the neurologist.

The chronic abdomen has been attributed to various causes at various times in the evolution of abdominal surgery for example ovarian-prolapse cysts adhesions neuralgia tubal-chronic salpingitis uterine-displacements appendiceal-chronic appendicitis renal-sorting kidney Dietel's crisis biliary-cholecystitis, calculous or non calculous duodenal-ulcer gastric-ulcer cardiospasm pylorospasm enteroptosis lues-gastric crises. But each of these has been insufficient as an explanation. The most recent explanation is the presence of intra abdominal adventitious bands or membranes, such as the ileal band and the pericolic or other membranes. But the fact that such structures were found to exist without causing symptoms has given rise to great confusion as to their clinical significance.

In order to arrive at some definite understanding as to the etiological relationship between these bands or membranes and the symptoms complained of the author has reviewed as to the remote result a series of cases in which the operative procedure was confined entirely to these structures so that favorable results if secured might be attributed to the removal or correction of coincidental pathological conditions.

Nineteen cases in which the appendix was previously removed are analyzed. In only one case

was the primary operation for acute appendicitis and in no case at the second operation was there any evidence of adhesions at the appendiceal stump.

The results are as follows. One case is too recent for consideration. 7 cases were markedly relieved

from symptoms. 11 cases showed no improvement. The primary result in all cases was favorable but the symptoms returned after variable periods. The author emphasizes the necessity of awaiting remote results before drawing conclusions.

SURGERY OF THE EXTREMITIES

DISEASES OF THE BONES JOINTS MUSCLES TENDONS. CONDITIONS COMMONLY FOUND IN THE EXTREMITIES

Mayer L. and Wehner E. : An Experimental Study
of Osteogenesis. *Am J Anat* 5 19 4 xii 213
By Surg Gynec & Obst

In view of the divergence of opinion regarding the function of the periosteum and the bone cell in regeneration of bone these experiments were undertaken with the hope of determining (1) to what extent the bone-cells of a transplant maintain their vitality (2) the relative importance of the periosteum and the connective tissue cells in osteogenesis and (3) the process by which the new bone replaces the transplanted bone. The 50 experiments consisted of periosteal transplants subperiosteal resections transplantation of bone and cap experiments. In these experiments the periosteum was removed over definite area and a glass or metal cap placed over part of this area so that the behavior of the bone cells could be studied beneath this cap without the possibility of confusion with periosteal growths. In 11 of the 4 experiments with free periosteal transplant the periosteum was gently removed without scraping and placed in the thigh. New bone was generated in all these transplants.

The conclusion from 6 experiments of subperiosteal resection of rabbits ribs is that the regeneration which takes place is due to periosteal activity and is not dependent upon outpouring of osteoblasts from the bone such as Macewen pictures. To study the osteogenetic function of the fixed bone cell 23 experiments were made on rabbits and dogs. Parts of the bone thoroughly denuded of periosteum were isolated by being covered with glass or metal caps 6 mm in diameter which were embedded with a groove cut with a trephine. Although in some of these the periosteum grew under the cap in 9 cases the periosteal growth was completely excluded and the bone under the cap after from two to fifty five days had not shown the slightest sign of regeneration. Twenty two experiments with autogenous bone transplants in rabbits support the view of the majority of observers that the transplanted bone does not live. These conclusions are at variance with those of Macewen and McWilliams who claim that the bone cells of the transplant live and proliferate.

Regarding the periosteum it is concluded that the new bone growth comes from its osteogenetic layer

and that in cases where the periosteum was macroscopically removed and regeneration took place there was microscopical remains of this osteogenetic layer still present on the supposedly denuded surface. The method of replacement of the old bone with new is an advancement of the living osseous tissue by intercellular deposits of bone and probably also by direct growth of the young bone cell into the old lacunae. The conclusions of the authors are supported by convincing camera lucida drawings of specimens from their experiments. W. A. CLA.

Pennister D. B. Necrotic Bone and the Subsequent Changes Which It Undergoes. *J Am Med Ass* 19 5 lxxv 11 By Surg Gynec & Obst

There is a great difference between the behavior of necrotic bone and that of necrotic soft parts. Because of its high content of calcium salts the stroma of bone resists the ordinary processes and requires special agents for its absorption. Its fate depends somewhat on the locality. For example if a bone transplant is made into other bone where function is desired the old bone is gradually absorbed and replaced by new bone by a creeping process of osteoclasts revascularization and proliferation of osteogenetic cells but if the transplant is into soft parts the bone becomes necrotic and is slowly absorbed with very little formation of new bone. In case of infection the process varies.

In osteomyelitis of long standing the walls of the cavity become sclerotic and the regeneration of new bone is prevented on that account. Here the necrotic bone becomes separated as a sequestrum but in less severe infections this does not occur the dead bone being absorbed and replaced without detachment.

In case a transplant becomes infected the process is similar to that used in osteomyelitis part of the transplant may be cast off as a sequestrum. Tuberculous of bone causes destruction so slowly that the absorption keeps pace with the destruction. The dead bone may be converted into bone sand by the invading tuberculous granulation tissue or if long standing may calcify. This calcification is regarded as a reparative process but it is not known whether or not the calcified masses are replaced by new bone. A thin layer of tuberculous granulation tissue separates the living bone from the dead and it is the author's opinion that from a pathologic standpoint surgical removal of this layer is clearly indicated in order that living bone may replace the necrotic bone. W. A. CLA.

Koch J. Experimental Rickets (Über e penim ntel
1 Rach us) Berl H W ch zch 19 4 11 773
836 886 By Zentralbl. f d ges Chir 1. Grenzgeb

The author refers to his earlier investigation of the relation between infection and bone changes in childhood and now claims to have demonstrated experimentally that rachitic bone changes are to be attributed to infection. Among the different laboratory animals he has found young dogs 8 to 12 weeks old most suitable for this purpose.

Among the bacterial cultures used which were injected intravenously he secured the most uniform results with streptococcus longus. While the injection of other bacteria usually caused general infection or intoxication from which the animal finally died with sepsis and with more or less involvement of the joints with streptococcus longus after a short general disease a localization at the joint-ends of the bone could almost always be demonstrated.

The acute stage of the disease is characterized as follows. After an incubation period of one to three days the joints and the surrounding tissues show painful swelling. The sequence of joint involvement is not uniform. The duration of this acute stage varies from a few days to two weeks. Microscopic and cultural examinations show that there is inflammation of the joint and surrounding tissues in which the primary or chief focus lies in the marrow of the metaphysis of the bone and the joint effusion, which is almost always at first is to be regarded as a secondary phenomenon. Cocci can be demonstrated only in the marrow of the metaphysis where they do not produce suppurative inflammation but only degenerative changes. The noteworthy fact that the streptococcus longus has only a slight pathogenicity with small tendency to suppuration and general sepsis in the young dog is analogous to the condition in the child which seldom has a general sepsis in spite of the frequency of hematogenous mixed infection with streptococci in the course of scarlet fever, diphtheria, measles, etc.

The microscopic findings show the following. Besides multiple disseminated pathological foci mostly necrotic parts of the bone marrow the most striking thing is the degenerative changes in the boundary between the bone and cartilage. After a time in the place of these degenerative processes marked proliferative processes appear and the hyperemia which was already physiologically present is increased by the long continued disturbance of intracartilaginous ossification. This chronic hyperemia in the osseous system is to be attributed to the fact that the normal already calcified bone undergoes a loss in calcium salts while such salts are not deposited in the new formed cartilage and bone tissue. The bone gradually becomes soft and pliable.

The chronic stage of the disease is characterized by the fact that after the cessation of the acute symptoms peculiar bone disturbances and deformities appear which in pronounced cases give the im-

pression of rachitic deformities. The author shows by a series of photographs how these bends in the bone and the thickening of the joint-ends develop. Besides these changes a disturbance of growth is observed throughout almost the entire skeleton as shown by abnormal softness and pliability and by changes in the teeth.

With regard to the histological findings in the osseous system the author considers the rachitic changes observed at the height of the disease as the end product of an incomplete and much disturbed regenerative process which takes place at the boundary between the cartilage and bone in the adjoining marrow and in the remainder of the bone during the growth of the animal.

In conclusion Koch attempts to refute the prevailing conceptions with regard to the cause of rickets and by his animal experiments shows that domestication, the relation of which to rickets in animals has been so frequently observed is only a predisposing factor. The primary cause is infection once or oftener and this is very apt to occur in animals that live unhygienically.

From his extensive experiments he concludes that streptococcus infection may cause a characteristic disease of the osseous system of young dogs during their period of growth that may be designated at first as a pathological disturbance of normal ossification but when in the further growth of the animal it becomes fully developed it cannot be called any thing else than a rachitic change from both the microscopic and microscopic pictures. STAMBLE.

Clifton M. B. The Diagnosis and Treatment of Osteomyelitis. J. & Gynec. & Obst. 913 23 6
By Surg. Gynec. & Obst.

The topics considered are the diagnosis and treatment of osteomyelitis and the observations are based on an experience with 31 cases. Nine acute cases were treated. The femur was involved 23 times, the tibia 1 time, the humerus 6 times, the radius 3 times. In 9 cases the femur alone was involved in 8 cases the tibia alone in 2 cases the humerus alone and in the fibula alone. The hip was involved in 15 cases 6 of which gave symptoms similar to tuberculosis.

In the acute stage the diagnosis must be made between septic thrombosis or in profoundly toxic cases from septicaemia. In osteomyelitis the swelling of the joint is usually late and swelling and tenderness of the limb is early. In chronic osteomyelitis differential diagnosis from tuberculosis, pyphyl and new growth has to be made. Tuberculosis a chronic disease that invades the epiphysis and syphilis give a similar picture both clinically and both ways.

The treatment in the acute stage is to drain the medulla by making a deep channel extending the length of the infection in the shaft. Gutta serena tissue is used to drain the medulla should never be cleaned out or curetted away as it is needed for endosteal regeneration. In the subacute and

chronic stage treatment of the femur and humerus is planned to allow the shaft to heal after efficient and sufficient drainage. If sequestra form they should be removed and the cavity wiped out with gauze — not curetted or disinfected. Mosetig-Moorhof's iodoform beeswax mixture is introduced into the cavity to act as a drain; it is partially absorbed and partially extruded.

When one bone of the forearm or lower leg is involved and at times the humerus the shaft is removed subperiosteally about 5 or 6 weeks after the acute stage. The periosteum should at this time be thick enough to cast a shadow on the X-ray plate. After removing the shaft the periosteum is sutured into a ribbon. New bone immediately begins to develop and in about four months can support weight. By this operation the healing time is much reduced and an infectious nidus is removed. Occasionally in badly infected cases complete regeneration does not occur and bone transplantation has to be resorted to after healing occurs.

Gilbert, O. O. A Case of Typhoid Osteomyelitis

J. Mich. St. M. Soc. 914 xi 4

By Surg. Gynec. & Obst.

The author reports a case of typhoid osteomyelitis of the tibia occurring two and one-half years after a prolonged fever presumably typhoid. The onset was characterized by moderate pain and tenderness followed four weeks later by a chill and temperature reaching 104. There was slight swelling and elevation of temperature over the upper portion of the tibia. The leucocytes numbered 5,300. The X-ray showed central erosion of the tibia with marked sclerosis and periosteal reaction. The diagnosis was based on the physical findings, absence of leucocytosis, marked Widal reaction. At operation a sequestrum and considerable pus were removed from which a bacillus was isolated in pure culture answering to the characteristics of *Bacillus typhosus*. The process is supposed to have been primary in the medullary cavity of the bone in contrast to the usual type in which the periosteum appears to be involved first.

From the literature it appears that typhoid bone infection may occur immediately after the fever or as late as seven years afterward. The bones most frequently involved are the tibia, ribs, femur, ulna, humerus, pelvis and foot. The prognosis is good though there is a tendency to chronicity and to recurrence in other bones.

F. J. GARNLEY

Wolfssohn, G. Biological Diagnosis of Surgical Tuberculosis (D. biologische Diagnostik chirurgischer Tuberkulose). Z. f. Inf. d. G. geb. d. M. d. Ch. 94 11 36

By Zent. lab. f. d. Ges. Chir. u. Grenzgeb.

On the basis of 264 articles from the literature and his own experience the author discusses the biological reactions in tuberculosis for the purpose of weighing their value in practical surgery.

1 From agglutination no conclusions can be drawn either as to diagnosis or prognosis. The complement fixation reaction is not specific but according to Hammar it has some importance in diagnosis. Wright's opsonin determination is beyond doubt of importance in diagnosis but on account of its great technical difficulties it cannot well be utilized in practice. Passive anaphylaxis and the microstagnin reaction have thus far been of scientific interest only in the diagnosis of tuberculosis.

2 Among the tuberculin tests the subcutaneous reaction with old tuberculin has not entered into surgical practice. In spite of its specificity and the manifest local symptoms especially in joint and kidney tuberculosis it still has its limitations, contra-indications and disadvantages. The danger of serious local reactions is almost entirely lacking in the so-called anaphylactic reactions. The von Pirquet reaction on account of its great sensitivity does not indicate whether the tubercular process is an active or a latent one except in children. In adults a negative reaction indicates very strongly that surgical tuberculosis is not present. In the intracutaneous reaction according to Engel a negative result when large doses are used — up to 10 per cent solutions — always proves the absence of surgical tuberculosis. A positive result is to be judged as in the cutaneous reaction. The conjunctival test indicates a probability of surgical tuberculosis; a negative reaction must be judged with great reserve.

3 Animal experimentation gives excellent results. The guinea pig test is an ideal method of cultivating tubercle bacilli if the animal gets sick, the pus, urine, etc. are tubercular. The question of the most suitable mode of infection and demonstration of the bacilli is not yet settled. A reliable method of quick diagnosis by means of animal experiments is also very much to be desired.

KREUTER

Frazer, J. The Etiology and Pathology of Bone and Joint Tuberculosis. J. Am. M. A. 95

1 7 By Surg. Gynec. & Obst.

Frazer takes up the etiology of bone and joint tuberculosis by describing first the type of the bacillus which causes the disease and second the route by which the germ arrives at the site of development. The type of bacillus may be of two important varieties — the human and the bovine but there are others of lesser importance — the avian, the piscine varieties. He gives five tests by which human and bovine bacilli are differentiated.

1 The rapidity of growth on inspissated egg shows that the human variety grows more luxuriantly than the bovine.

2 A medium of egg and glycerine will grow the human type better than the bovine — the latter germ may not grow in this medium.

3 The shape of the bacilli was formerly a test but is now considered useless the long type was considered human the short bovine bacilli. The

nodular staining using Cram's modified stain will in the human variety how dark nodules which are not apt to appear in the bovine type

4 On a medium of bouillon and glycerine of a known acidity the human growth will increase the acidity while the bovine decreases the acidity and alkalinity may develop

5 In the inoculation test two rabbits are used each being inoculated with a different type of bacilli. The one injected with the human type after 12 months showed a few tubercles in the lungs the rabbit showing no ill effects during life. The other rabbit inoculated with the bovine type showed gradual cachexia ending in death within six weeks.

By using such methods Fraser has found that in a series of patients 62 per cent owed their disease to drinking milk infected with the bovine bacillus while 38 per cent suffered from the human type. A family history of pulmonary tuberculosis was found in 71 per cent of those infected with the human bacilli.

The route of infection is from some tuberculous focus in the body the infection being carried by the blood and lymph streams. The bacilli enter the joint via the nutrient or metaphyseal arteries.

The synovial membrane is first involved as healthy bone cannot be infected the marrow must first succumb to gelatinous degeneration which in turn produced by tuberculous toxæmia an endothelitis of the arteries supplying the part. All this occurs before a tuberculous osteomyelitis develops.

The pathology will show in involvement of any part of the bone but the local reaction depends on the situation of the reflection of the synovial membrane.

If the synovial reflection is in relation to the epiphysis then that portion is attacked. It is supposed that the focus of infection is begun by an infected blood-clot a slight trauma may be the contributing cause. A follicle develops in the marrow which may soften and an infiltrating tuberculosis result or the tubercle may become localized and an encysted tuberculosis result.

The changes in the marrow show two stages. In the early or cellular phagocytic action of the white cells takes place until fibrosis results. The later or fibrous stage is characterized by an absence in fat corpuscles and more fibrous tissue resulting in an encapsulated focus. The lamellar changes show a tuberculous process developing in the bone. The process may be of two types—one where the lamellæ are absorbed or osteoporosis results the other where the lamellæ are increased in thickness by fibrous deposits. The periosteum shows either a deposit of dense or porous bone. The blood vessels show a condition of endarteritis.

Fraser divides osteous tuberculosis into four varieties: (1) the encysted tuberculous lesion (2) the infiltrating lesion (3) the atrophic tuberculous lesion and (4) the hypertrophic lesion.

J. H. Sauer

Guyé G. A. Local Reactions in the Heliotherapy of So Called Surgical Tuberculosis (Les réactions de foyer dans l'héliothérapie des tuberculoses dites chirurgicales). *Pa. et Méd.* 1914 1 615
By Zentralbl. f. d. ges. Chir. u. i. Grenzgeb.

The local reactions that appear under heliotherapy are increase in volume in closed tuberculosis localized sweating and rise of temperature over the focus, demonstrable change in consistency and palpation that can be demonstrated on palpation. In cases of fistulous tuberculosis there is generally a decrease in volume there is more abundant secretion which has a tendency to become hemorrhagic serous and finally there is reddening and swelling of the edges of the fistula.

As to the immediate effect of heliotherapy on joint function it often grows worse at first on account of increased swelling but almost immediately afterward there is an improvement—fibrous ankylosis. Among the symptoms noticed by the patient are a circumscribed feeling of heat in the irradiated joint decrease or cessation of pain in abscesses sometimes a feeling of pulsation, in overdosage an unpleasant or even painful feeling of tension. In order to avoid overdosage use is made of the thermometer and clinical observation.

The degree of the local reaction is dependent on different factors such as general health. Advanced cases of tuberculosis often react with very pronounced rise of temperature, even when not the focus but a different part of the body is irradiated. The same may be said of focus in an acute stage of development.

The depth and localization of the focus also influence the degree of the local reaction. Guyé describes the therapeutic effects of this local reaction as follows: disappearance of pain increase in mobility retrogression of exudates loosening of hard infiltrations discharge of sequestra etc. as has previously been described repeatedly by Rollier.

Overdosage may produce serious consequences, may even cause spreading and generalization of the tuberculosis. The local reaction is inflammatory in nature. It is very important that close watch be kept of the patient during the sunshine treatment. An effort is made to produce slight reactions. If success is not attained with the usual technique it is best to be satisfied with distant irradiation that is the focus itself is not exposed to the sunshine bath but more or less of the rest of the body.

A. Kestad

Bromley L. Tumor of the Upper Extremity of the Femur. *Proc. Roy. Soc. Med.* 1914 vol. Sect. D. Child 5. By S. R. Gynec. & Obst.

Bromley reports a case of a patient aged 12 years, who had noticed a swelling in the right thigh for seven or eight weeks. He complained of pain in the right leg especially after walking some days the pain was so severe that he was unable to walk. When the patient was 5 years old he was said to

have fractured the right femur since which time he had had intermittent pains of an aching character which had recently increased

On examination a hard swelling of the upper third of the right femur was felt there was no definite margin and no heat or tenderness and movements at the hip joint were free. Skiagraphic examination showed an endosteal growth of the femur

An exploratory incision was made. The bone was found to be expanded and covered by normal periosteum a thin layer of compact bone surrounded a mass of cartilage which had entirely replaced the medullary cavity. A portion removed for microscopic examination showed pure chondroma and there was no suggestion of malignancy.

EDWARD L. CORNELL

Berry J. Clinical Notes on Malignant Tumors of the Long Bones. *Intern J S & O* 1915
vii By Surg Gynec & Obst

This is a consideration of (1) osseous carcinoma by direct extension and as a secondary deposit dwelling especially upon spontaneous or pathological fracture in these cases and (2) primary sarcoma both of the periosteal and the endosteal variety

Sarcomata at the ends of the long bones are very likely to be mistaken for disease of the neighboring joint. The author reports a number of cases illustrative of the various types of malignant growth and considers the treatment both surgical and palliative at some length. H W WILCOX

Knaeggs R L and Grun r O G. A Contribution to the Study of Ossification in Sarcomata of Bone. *Brit J S & O* 9 4 1916
By Surg Gynec & Obst

The author reports three cases of sarcoma of bone as follows

1. In osteosarcoma of the humerus of eighteen months duration in a woman of 43 an area of hard bone was found in the center surrounded by softer tissue with some patches of translucent gristly material. The lower half of the humerus was involved. Ossification progressed from hard areas growing in the softer mass. Spindle shaped and round cells were numerous. In the area of ossification were found elongated cells with faintly staining nuclei. They were neither connective tissue cells nor osteoblasts but were no doubt sarcomatous in nature although differing from the ordinary spindle cell of sarcoma.

2. The second case was periosteal sarcoma of the ankle in a girl of 6 death resulting from pulmonary metastases. Sarcomatous tissue about half an inch thick surrounded the tibia. The predominating histologic elements were spindle cells. At the points of ossification some of the cells resembled bone cells. There were some points where deposits of lime salts were seen around the sarcoma cells.

3. The third case was myeloid sarcoma of the astragalus in a woman of 20. The structure was

a fine regular cancellous network in which spindle cells predominated. Many giant cells were seen but not in the same relation to the bone as osteoclasts.

In these three cases it is shown that ossification takes place in endosteal sarcomata and that the active element seems to be the sarcoma cell. The bone formation occurred independently of perosteum which is contrary to the belief that ossification can occur only in periosteal or subperiosteal sarcomata.

W A CLARK.

Brickner W M: A Simple Easily Regulable Method of Applying Abduction in the Treatment of Shoulder Disability. *Med Rec* 1915
lxxvii 15 By Surg Gynec & Obst.

The author describes his method of maintaining abduction of the shoulder and arm in cases of sprain and tears of the capsule and in those cases of subacromial bursitis which do not require operation. He states that in three successive cases of forward subluxation of the head of the humerus with extreme disability this treatment brought about a cure in two weeks. By this method with the patient semirecumbent in bed the arm is abducted as far as it can be comfortably a muslin bandage is looped about the wrist carried to the headpiece of the bed and fastened there. The upper end of the bed is raised on blocks and as the patient slides down in bed his arm travels relatively farther up. Many cases that have resisted efforts to forcibly abduct the arm yield painlessly to this gradual countertraction.

The method is not advised for recent fractures or dislocations or for joint inflammation.

H W WILCOX

Ridlon J. Coxa Vara. *J Am M Ass* 1915 lxiiv
9 By Surg Gynec & Obst.

Ridlon gives an account of Elmslie's views of coxa vara and particularly calls attention to his definition i.e. that coxa vara is an anatomical term indicating the condition of depression of the neck of the femur together with a decrease in the angle of the femoral neck.

The signs he observes in coxa vara are adduction of the femur with eversion and also flexion in some cases, and diminution in abduction with shortening made apparent by elevation of the trochanter. Other conditions may reveal these signs but a different deformity is present in the femoral neck.

Ridlon says he regards adduction with outward rotation and limitation of abduction and inward rotation as the first important signs of coxa vara. He also notices the fact that in many cases of coxa vara in children who are fat the boys take the feminine type and both sexes have underdeveloped sexual organs.

There are some forms of coxa vara due either to fracture of the neck of the femur with bad union or to the action of disease in the joint.

Ridlon objects to calling fractures of the neck

epiphyseal separations and other pathological conditions coxa vara and says we cannot call coxa vara by such terms as adolescent or traumatic coxa vara but that it should be called simply coxa vara.

The treatment which has brought the best results in Ridlon's experience has been strong traction with abduction of the limbs at the same time a plaster cast is applied from the ankle to the nipples. The patient is allowed to lie down or walk as he so desires. After walking has been continued three or four months without pain the treatment is discontinued. J H SHAW

Steindler A. Coxa Vara Adolescentium Traumatica. *J Am Med Ass* 9 5 12 9 6

By Surg C. J. & Obst

The author confines himself to the coxa vara of adolescents in which a causative or contributory relation exists between trauma and deformity. Several classifications are given and a review of the literature on the subject shows that trauma plays an important rôle in the etiology. Wulstein and Rammstedt's experiments are cited showing that separation of the epiphysis may be produced by direct trauma to the trochanter when the pelvis is fixed and the thigh in extension the periosteum holding the head in place until later the body weight loosens it. Steindler contends that a period between the ages of 9 and 16 exists when trauma major or lesser may cause epiphyseal separation with or without preexisting or coexisting rickets followed by a deformity known as coxa vara adolescentium.

Ten cases are cited and the following points significant in diagnosis are cited:

1. Injury to the hip of moderate extent fall or wrench.

2. An intermediate period of functional freedom.

3. No or very mild subjective symptoms.

4. The late and gradual development of the coxa vara deformity and disability.

5. The age of the patient.

The value of the roentgen ray cannot be too highly considered as the injury may be slight and the lesion show until later as is the case in Kämmler's post-traumatic lymphosis. H. A. W. MEXSON.

Rosenow E. G. Relation of Focal Infection to the Bacteriology of Arthritis. *Lancet* 19 5 1913. By Surg C. J. & Obst

Rosenow has isolated streptococci from the joint fluid in nearly all of a series of twenty cases of typical rheumatic arthritis. The cocci resembled those described by Poynton and Paya and produced a similar arthritis in animals when injected soon after isolation. He believes that the facts warrant the conclusion that in rheumatism we are dealing with streptococci which differ from the more virulent hemolytic forms. The chief objections to the infection theory are the failure to discover a typical picture in so many cases and the negative results of bacteriological examination of blood and of articular fluid exudates.

The author examined glands excised under strict aseptic conditions from which inoculations were made using chiefly tall columns of ascites-dextrose agar. In nearly all of a series of 64 cases of arthritis deformans thus examined organisms were found although the cases ranged in duration from one to seventeen years. Several organisms were found in some glands in no case were the streptococci hemolytic for human blood but they resembled streptococcus viridans and showed anaerobic preferences in the primary cultures. In some cases identical organisms have been isolated from widely separated regions as from the epitrochlear and femoral glands. Marked improvement has followed the use of autogenous vaccines from these glands. Examination of the periarthritic structures shows complete plugging of the blood vessels due to primary endothelial proliferation rather than to organized thrombi. These changes are believed to be primary rather than secondary and it seems likely that the organisms are taken up from the circulation by the epithelial cells which then proliferate freely and thus cut off the blood supply resulting in areas of diminished nutrition and oxygen tension a condition favorable to the multiplication of anaerobic organisms. C. F. WELLS

Rannels D. S. Some Essential Points in the Etiology and Differential Diagnosis of Rheumatic Conditions and Neuritis. *Chic* 9 5 1913. By Surg C. J. & Obst

This paper is largely an enumeration with some discussion of the conditions commonly dealt with by physician as rheumatic or rheumatism.

These conditions are listed by the author as auto-toxemia poisoning by lead arsenic etc. diabetes thyroid or adrenal insufficiency trichinosis due to indigestion of trichinae in pork. Many chronic joint diseases are probably due to disturbed physiology resulting from malposition of the viscera viz. visceropneumonia. Other conditions are joint straits tuberculosis neuralgia hysteria neurasthenia muscular overstrain myositis, acute polyomyelitis neuromyositis, ocular errors in refraction gout subacute combined degeneration of the spinal cord ascending neuritis intervertebral neuritis cervical pachymeningitis cervical caries malignant disease of the cervical vertebrae psoriasis, neuromata fibromata supernumerary seventh cervical rib enlarged glands in the axilla aneurism of the subclavian artery aneurysms of the aorta occupation neurosis visceral disease or tumors in the pelvis disease of the mors involving the sacral plexus gonorrhea large focal accumulations in a displaced colon and a few others.

Rannels discusses acute rheumatism by itself as a disease resembling those acute infections of which the infective agent is known. He says he believes that the true pathogenic agent has not been definitely isolated but that these bacteria—presumably those of typhoid pneumonia etc.—are only secondary factors in complications.

He speaks of rheumatoid arthritis and reports a case in a child twelve years old. He says that lately the differentiation of chronic articular rheumatism and arthritis deformans has been given up whether the disease is bacterial or a trophoneurosis the future must decide.

Neuralgia and muscular rheumatism are regarded as clinical entities by the author. He discusses at some length the pains caused by various intra-abdominal conditions and emphasizes the importance of distinguishing between organic affections of the abdominal viscera and true and other neuralgias and neuritis affecting the peripheral nerves at any point after leaving the spine.

He specifies two forms of viceroprostis likely to cause pains simulating rheumatism—congenital and acquired. The congenital form is due to malnutrition in early infancy caused either by errors in diet or by constitutional disease. The acquired form is due to allowing the body to become too much emaciated either from habit or disease or the assumption of incorrect posture.

He believes that not all patients suffering from pain in the sciatic distribution are cases of sciatica. The physician must satisfy himself that none of the above conditions exist. He advises that in all cases of neuralgic or neuritic pains the urine should be carefully examined and that in all cases of rheumatic conditions the tonsils should be carefully inspected and removed if found diseased.

II. WINNETT ORR

Allison N. and Brooks D. Ankylosis an Experimental Study. In *W. J. G. S. I.* 39.
By S. W. Gyn. & Obst.

The authors recall the literature of ankylosis calling attention to Hoffa's assertion that a bony ankylosis may be produced in two days and that Nichols and Richardson's classification of processes of bony ankylosis namely (1) osseous transformation of proliferated perichondrium (2) osteoblastic growth and (3) osseous transformation of fibrous tissue. They report some experiment of their own which were undertaken to study the changes in joint structures which take place during the process of ankylosis.

All these experiments were performed on the knee joints of dogs. Eight were partial excisions, the joint three were destruction of joint articular surface injury to cartilage and in seven direct section of joints were produced. In the partial excision 0.5 cm. of the bone ends were saved off.

Complete bony ankylosis was not evident in these experiments until five to six months had elapsed. Previous to this there was fibrous ankylosis and early a six day the opposed ends were united by fibrous exudate. After destruction of articular surface by uretic gun union took place in a much the same manner after partial excision. In one of these cases a total bony union was not complete after eleven months.

In the direct infection experiments staphylococcus aureus and tuberculous bacilli were injected. The joint changes were the same for both organisms. There was marked swelling, heat and tenderness. Fibropurulent exudate produced adhesions resulting in diminution in the size of the joint cavity. Destruction of joint cartilage occurred as a result of absorption by granulations.

The process of bony ankylosis is summarized as follows: (1) union by granulation tissue (2) union by dense fibrous tissue (3) metaplasia of fibrous tissue into cartilage and finally into bone. The slow process of bony ankylosis explains why after arthroplasty a joint may be movable for some weeks but subsequently may become stiff. It also suggests that clinically fixation after arthroplasty must be continued for a long time to prevent deformity. W. A. CLARK

Con. S. M. The Injection Treatment of Infected Joints. In *J. Orth. S. G. Q. S. U. S. O. I.* 153.
By S. W. Gyn. & Obst.

For many years the author has been using a 5 per cent carbolic acid solution followed by alcohol for injection of infected joints. In some cases in which he lesions adhesions to form he uses pure carbolic acid. By experiments with rabbits he found that 1 per cent carbolic acid causes a slight congestion at once but ten days later no change is apparent.

Three cases of hydrops articuli were treated by this method with good results. Ten cases of gonorrheal joints were all relieved, some requiring two or three injections. A case of staphylococcus infection of the elbow was cured in a week by one injection. In three cases of villous arthritis no good results were obtained. Syphilitic and tubercular joint seem to have been generally unresponsive to this treatment. W. A. CLARK

Felds, S. O. Subacromial Bursitis. In *W. J. G. S. I.* 63.
By S. W. Gyn. & Obst.

Since the appearance of Codman's paper on subacromial bursitis in 1906 more attention has been paid to diagnosis of affections in this region. It is now known that the subacromial is an extension of the subdeltoid bursa and not a separate sac as it was formerly considered to be. It is doubtful whether direct trauma is an etiological factor for the bursa is well protected but indirect trauma from fall on the elbow or the tendons of the arm cause a great many cases. Excessive use of the arm in untrained individuals is noth cause. Infection is also an important factor in the etiology. Case sometimes occur with acute tonsillitis or with gonorrheal urethritis. Pain, tenderness and limitation of motion are the principal symptoms.

The treatment generally recommended is immobilization with the arm in abduction. The author has adopted the plan of injecting the bursa with 2 to 4 ccm of iodoform glycerine emulsion. This brings almost instant relief from the pain. The arm is

put in a sling with the elbow supported. The sling is removed usually after three days, and by eighteen days the patient is usually able to return to work.

W A CLARK

Coenen H : Cancer of the Hand After a War Injury (Handkrebs als Spätfolge einer Kriegswunde) *Berl kl Wchscr.* 94 H. 1880

Dr. S. M. Gynec & Obst

Coenen describes a case of cancer of the back of the hand developing in 1913 in a patient who had been wounded by the explosion of a bomb in 866. Most cancers of the hand developing in old scars are on the back of the hand. Cancers may also develop from the chronic irritation caused by warts. Several such cases are cited.

Michael describes 64 cancers of the back of the hand and only 3 of the palm. Wounds of the hand are very frequent in war and they are generally of such a nature as to leave deep and extensive scars. The possibility of cancer as a late result of these scars is one of the things that must be reckoned with in considering war injuries. A Gos-

A Gas

Sh pley A M and Lynn F S Internal Derange-
ments of the Knee-Joint Maryland W J
are lynn S By S in Gynec. & Obst.

By S. M. GYPER, A. Obst.

The authors call attention to some of the peculiarities of the anatomy of the knee joint which account for many of the derangements to which the joint is subject. The chief source of weakness; the reliance for strength entirely on ligaments; the arrangement of internal ligaments and the false ligaments which consist of folds of synovia covering fat pads. These last are best seen in the supra and infrapatellar pads which are composed of fat and blood vessels covered with synovial membrane and render the joint surface irregular thus contributing to the liability to disease. They play a great part in inflammations and are the source of origin of foreign bodies the so called joint mounds formed by hypertrophic and sclerosing processes followed by constriction and ultimately by the separation of the sclerosed fringes. C. E. WILKINS

C E W LLS

FRACTURES AND DISLOCATIONS

**Stern W G Th Three Cardinal Clinical Signs
of Fracture into or near Joints J Am M
As to a lxx By S g Gyne & Obst.**

By S. E. Gynec & Obst.

The author reports briefly a number of interesting cases illustrated with radiographs, of partial or complete fracture previously not diagnosed as such and draws the following conclusions:

Every suspected fracture should be roentgenographed.

Ninety per cent of all sprains coming to röntgenography or consultation are fractures

When all the usual classical signs of fracture are lacking the presence of localized bone tenderness swelling and bloody discoloration alone are diagnostic of fracture

G ORGE I BALMAIN

G ORGE I BALMAIN

**Wilkey A G Ununited Fractures Treated by
Long Axial Drilling. *Brit J Surg* 9 5 423
By Surg Gynec & Obst**

By Surg Gynec & Obst

Wildey's operation for ununited fractures consists in thoroughly exposing and cleaning the ends of the fragments at the seat of fracture refreshing them by removing the thinnest possible transverse section of bone that will insure a complete removal of all dense fibrous tissue and drilling in the long axis of the shaft several channels in the sclerotized bone ends. This produces an artificial porosity of the osseous tissue. The drill is made to penetrate the healthy bone at the same time the medullary cavity which may be found occluded is made patent by longitudinal perforations. Apposition and immobility of the fragments are secured by mechanical means.

The above method, which has been employed in many cases of long standing non union, has not yet failed to produce an abundant callus. Gratifying results have been obtained where a previous and unsuccessful operation had so shortened the leg that any further removal of the indurated bone would have left functional disability. *Lancet tech*
R O RITTER

R. O. RUTTER

Grant A R Advantages of External Plates in the Treatment of Complicated and Irreducible Fractures *Br J Bone & Joint Surg* 1974; 56: 1-14

By Super Games & Clus!

The author introduces a new external plate for all varieties of oblique compound and complicated fractures. He describes it as a modification of the Parkhill clamp. It consists of four screws four inches long with a thread that will not crack the bone and a bolt head so that a wrench key may quickly turn them into place. Four flat horizontal leaves with a hole at one end of the vertical screws, each held to its respective place by two lock nuts, the whole being locked by a clamp gripping the horizontal leaves.

Grant's technique is as follows. After a wait of 3 to 6 days the usual skin preparation is supplemented by an additional application of 5 per cent iodine. An incision is made over the fracture and reduction is accomplished the bones being held with a Lowman clamp if necessary. He drills two, three or four holes in the bone ends, turns the vertical screws into the bone, adjusts the horizontal plates, sews the soft tissue as closely as possible with silkworm gut and applies moist dressings. The stitches and levers are removed at the end of two weeks.

JAMES O. WALLACE

JAMES O WALLACE

Mau laire Symptoma Diagnosis and Treatment
of Fractures of the Lower End of the Humerus
(Symptome diagnostique et traitement des fractures
de l'extrémité inférieure de l'humerus) Rev. h
brige 1 d ord d l Fra cc 94 65
BvZentralbibl d ges Chr u : Grenzgeb

ord d l Fra cc 94 05
By Zentralbl f d ges Chir u i Grenzgeb

The author reports a case of fracture of the internal epicondyle in which the line of fracture reached

into the elbow joint (trochlea). In connection with it he gives a detailed discussion of the findings in the form of fracture mentioned in the title. Differential diagnosis must be made from posterior and lateral dislocation of the ulna and spraining and solitary dislocation of the radius. He divides these fractures into (1) frequent (a) supracondylar (b) fractures in T or Y-shape (c) internal oblique fractures (d) external oblique fractures (2) rare fractures (a) condylar fractures (b) trochlear fractures (c) epitrochlear fractures (d) epicondylar fractures (e) comminuted fractures (f) separation of the epiphysis.

The roentgen picture is very important. The prognosis is in general good. Possible complications are ankylosis, paralysis of nerves, osteomata, cubitus valgus and more rarely varus.

Supracondylar fractures are treated by means of a plaster cast for 20 days when slight movements are begun. In the other cases light massage is recommended from the first. Too strong massage produces hypertrophic callus especially in children. If there is hypertrophic callus hemisection may be undertaken. Embedded nerves are freed. In complete separation of the epiphysis accurate reposition is sufficient. *Gräve*

Walker J B. Femur Fractures. Statistics of End Results. In *J S G* 9 4 vii 449.
By Surg. Gynec. & Obst.

The author states that when the studies which are now being made of fracture statistics are completed it will mean that the most efficient treatment will be demanded.

He believes that thoughtful surgeons are coming to the conclusion that the average results are very unsatisfactory due to inefficient treatment and that it is necessary to establish authoritative standards by which subsequent fracture work can be measured and compared.

General hospital records are notoriously inadequate for end results are seldom stated. Patients are discharged as cured on leaving the hospital at the end of eight to ten weeks always going away on crutches.

The more carefully fracture patients are followed up the more astonished one is to learn how many patients are permanently more or less disabled and how rarely ideal functional results are secured.

In gathering statistics from histories in 340 fractured femurs collected from several hospitals Walker found that the methods of treatment were very dilatory and most inefficient.

Among various statistics quoted is the following from the Austrian Government.

Of 857 fractures of the femur 153 or 17.8 per cent recovered with only temporary disability. 99 had a loss of 9 to 19 per cent of their earning power. 64 a loss of 19 to 32 per cent. 134 a loss of 33 to 48 per cent. 330 a loss of over 50 per cent and 38 per cent of all cases suffered a loss of 50 per cent earning power.

The author suggests the following rules for more efficient treatment.

- 1 Thorough reduction under anesthesia.
- 2 Traction and countertraction immediately after reduction and of sufficient amount applied a sufficient length of time to secure correct fixation of fragments and anatomical position. Bad results are nearly always associated with angulation.
- 3 Radiograms must be systematically employed in all cases of fracture of the femur to control the results of reduction.
- 4 Sufficient time for consolidation must be allowed before weight bearing is undertaken.
- 5 Certain cases where adequate reduction cannot be made should be operated upon and immediate operation should be made as statistics show better functional results in cases in which earlier operations were done than in cases where operations were secondary after failure in the other treatment. Operation is indicated in all fractures of the upper and lower thirds of the femur where the fragments are much displaced and in special fractures of the shaft.

In conclusion he states that surgeons in selected cases of fracture of the femur are obtaining the same brilliant results after immediate operations that have been obtained in early operations for acute appendicitis and gastric and duodenal ulcers.

JAMES O WALLACE

Pekham F E. Fractures of Both Bones of the Leg. *J Am M A* 9 5 ix 308.
By Surg. Gynec. & Obs.

Pekham believes that each fracture is a definite mechanical problem and to secure definite knowledge of it two or more X rays should be made. From these the procedure to be followed in reduction can be definitely determined. If there is swelling the leg is put up in a pillow splint and elevated until the swelling has disappeared.

The patient is then put on a Bradford frame with an upright for counterpressure at the asymmetry. A windlass attached at the end for traction is so arranged that traction may be applied to the uninjured leg also. The patient is completely anesthetized. The foot and the ankle are bandaged to prevent swelling. Sheet cotton being applied over both legs. A piece of thick felt is placed over the foot and about this the traction straps are applied. Cross-bands to support the leg are placed at various points on the frame one being placed directly under the fracture. Traction is applied until the surgeon believes end-to-end apposition of the fragments has been secured. X ray pictures are then taken and examined. If the reduction is complete the plaster band is applied. If the reduction is not complete manipulation is continued until the desired result is obtained. Shown by X ray pictures. When the plaster has set pictures are again taken to show that the fragments have not slipped and again in two weeks and if necessary further manipulation is done.

The traction straps may be applied so as to give a pull on the inner or outer side of the foot or an even pull on both sides.

The plaster is worn for a month. It is then valued and the posterior half worn for two weeks more.

Four cases are reported and the paper is illustrated by cuts showing the method of application of the plaster and X-ray plates of the cases.

ARCHER O'REILLY

Breton P. *An Unusual Case of Ununited Fracture of the Tibia Repaired by Bone-Grafting*. *Br J Med* 9: 5 1934.

By Surg. Gynec. & Obst.

LeBreton reports with adequate illustrations an interesting case in which a boy of seven was operated upon for an ununited fracture of the tibia just below the knee which had existed since he was three weeks old. The boy walked with a bad limp, weight-bearing being entirely through the fibula and the ligaments of the knee. The fragments of the tibia were freely movable.

At operation the ends of the old fracture were exposed and chiseled out to receive the graft. The old fragments could not be approximated so a graft from the other tibia was fitted and held by Langens tendon and chromic catgut. Union was firm in eight weeks. Later an osteotomy was done lower down to correct the acquired bowleg. The final result was very good with shortening compensated for by a high shoe. II WRIGHT OR

Cotton F. J. *A New Type of Ankle Fracture*. *J Am Med A* 91: 1933.

By Surg. Gynec. & Obst.

Cotton describes a fracture which although not new he considers has not been adequately described. The condition is one in which there is a fracture of both malleoli with splitting away of a wedge large or small from the back surface of the tibia at the joint—a wedge that is displaced backward carrying with it the posterior tibia—astragaloid ligaments with dislocation up and back of the foot. As a rule the posterior tibial fracture is separate although sometimes the internal malleolus is included with it in one piece that is split away in a spiral line. The fracture of both malleoli frequently causes this fracture to be confused with Pott fracture but the two conditions are quite different. Cotton has seen fifty three of the fractures he describes in the last seven years and during this time saw only one case in which a real posterior luxation accompanied a Pott fracture.

If the condition is not recognized and properly treated marked interference with the ankle-joint will result. A new joint must be formed between the tibia and the neck of the astragalus lying in limited dorsal flexion and lateral instability.

In fresh cases Cotton reduces the dislocation at once by forward traction with the muscles relaxed in moderate plantar flexion after reduction plaster

is applied with the foot in maximum dorsal flexion. No weight should be borne on the foot for seven or eight weeks. In old cases Cotton operates. As a rule he makes an incision on the outer and inner sides then after dividing both malleoli above the joint level he loosens up the whole joint and if necessary cuts out a fresh joint surface on the forepart of the tibia to slip the astragalus into. The results have been satisfactory.

FRANK D. DICKSON

Runyan R. W. *Dislocation of the Semilunar Bone*. *Surg. Gynec. & Obst.* 91: 5 1934.

By Surg. Gynec. & Obst.

The series reported comprises all of the cases treated in Ancon Hospital in the past six years during which period there have been approximately one hundred and twenty thousand admissions. All of the patients were males ranging in age from twenty to fifty-four. Five of the dislocations were of the left wrist and three of the right. Half of them were due to falls upon the outstretched hand while the others were the result of heavy blows upon the dorsum of the wrist. The dislocations were all anterior with the concave articular surface facing forward or downward. The combination of marked swelling, spasm and prominences on both the anterior and posterior surfaces of the wrist slight silver fork deformity with no change in the position of the styloid processes furnish sufficient data to make a diagnosis but should be confirmed by a X-ray examination both anteroposterior and lateral.

But cases of the series were uncomplicated. In cases there were fractures of the scaphoid in 2 there were Colles fractures—one of which was compound—one had a fracture of the ulnar styloid and one had fractures of both the scaphoid and os magnum. Closed reduction was tried in the simple cases and was successful in 3 instances.

The method of reduction consists of traction upon the hand and hyperextension of the wrist and while counterpressure is made over the semilunar on the anterior surface of the wrist the hand is brought over into complete flexion. Should this fail it is necessary to make an anterior incision between the flexor tendons and either reduce or excise the dislocated bone. Of the 5 open operations 2 were reductions and 3 were excisions.

Grouping the cases according to the method of treatment there were 2 perfect results and 1 poor one in the closed reductions of the 2 open reductions, was fair and the other poor. The 3 excisions resulted very poorly: 2 stances and only fair in the other.

Jones J. P. *Congenital Dislocations of the Hip*. *Internat Med* 9: 5 1933.

By Surg. Gynec. & Obst.

The author briefly reviews the history of congenital dislocations and under etiology gives the three common hypotheses and briefly discusses them. He also discusses symptoms and diagnosis.

Under treatment he goes into early and late modes and then discusses fully G G Davis treatment.

He dressed his cases in plaster of Paris casts from above the pelvis to below the knees. The thigh is held in marked abduction and external rotation. The patient is then put on a Bradford frame elevated about two feet allowing the leg and foot to drop over the edge of the frame thus correcting external rotation and causing the head to produce pressure against the acetabular cavity.

The patient is made to walk after two months being supported by an attendant. At the end of 4 to 6 months the cast is changed and the abduction gradually corrected to the normal position in 18 months. The child is taught to walk in a rolling chair. Four cases treated in this manner are described and illustrated by a number of sketches and photographs. JAMES O. WALLACE.

Starr C. L. Congenital Dislocation of the Hip. C. d. M. A. J. 9, 26. By Surg. G. C. & Obst.

The author briefly gives the history, etiology, pathology, symptoms, diagnosis and treatment of this interesting condition.

Until the past two decades practically nothing was done toward treatment of this deformity. At first open operative methods were used by Hoffa, Paci, and Lorenz, who made a pathological study of the condition and developed the manipulative method.

The cause of this condition, which according to Ledam, occurs only in the human foetus, is due to mechanical pressure, the thighs being flexed and adducted in utero, making pressure on the posterior wall of the acetabulum, causing it to become ovoid instead of round, also a certain degree of twist or torsion in the neck of the femur takes place, permitting the head of the femur to ride upon the anterior margin of the acetabulum, producing a leverage which is to throw the head completely out of the socket.

The bony changes are: shallow ovoid acetabulum, with the head of the femur, the head of the femur being flattened, the capsular ligament thickened, and elongated, the ligamentum teres often disappears, the adductor muscles are shortened.

The condition is recognized only when the child begins to walk, with the characteristic waddle gait, and is that of the painful double congenital dislocation, the symptoms are more prominent.

The diagnosis is easy. The history, the gait, the location of the head of the femur with a radio-graph make the diagnosis complete.

According to the author, experience about 75 per cent of the cases under eight years of age can be reduced by manipulation and a perfect anatomical functional result obtained. In some 5 per cent operative reduction is necessary. The chief danger in his cases was due to a thickened and contracted contraction of the capsule. He follows

a modified Lorenz method using as little force as necessary to replace the head. The limb is put up in moderate abduction and inward rotation, avoiding the difficulty of overcoming the subsequent extreme rotation of the limb. The child is put upon its feet as soon as possible and in two to three months the limb is brought down parallel with its fellow. The author has been able to anatomically cure 7 per cent of his cases and to get a good functional result in 10 per cent more, due to anterior transposition. Some 5 per cent have been subjected to operative interference with good results. The remaining cases have been unimproved or have resulted in ankylosis. C. C. CHATTERTON.

SURGERY OF THE BONES, JOINTS, ETC.

Ashhurst A. P. C. Modern Bone and Joint Surgery. 11 M. J. 915, 185. By S. G. Gynec. & Obst.

In the last twenty years there has been a marked advance in bone surgery, showing that excision of tuberculous joints and osteotomies for rickets and coxalgia are unnecessary. The author considers that fractures should be treated by surgeons and if sufficient reduction is impossible by manipulations, open operation should be resorted to early.

Perfect anatomical relation is not always necessary for good functional results, except where fractures occur near or into a joint, but it is always preferable. In his opinion, non-union and mal-union are often due to improper treatment. Complete reduction followed by bone plates, bone grafts, or inlays will secure uniformly good results in nearly all cases of fracture. Proper osteogenesis is the primary requisite.

In the treatment of ankylosed joints, arthroplasty has supplanted excision. The interposition of fat and fascia is giving fairly uniform results and greater range of motion is achieved. Bone transplantation has proved its value in Iodine disease. Bone inserts or inlays have given good results where bone tumors were removed. The author considers these methods applicable in practically all cases of bone pathology. H. W. WALTERS.

Wright J. S. An Operation for the Flongation of Bone. 11 M. J. 915, 95. By S. G. Gynec. & Obst.

Wright calls attention to the lack of bony growth in the lower extremities. When the lower extremities are short, the long leg by an inch it makes little difference, but the same amount of shortening in the shorter leg may cause quite a perceptible limp.

He limits a method which he used in one case. A femur fractured and healed with shortening and angular deformity was cut off, the ends from opposite sides at points about two or three inches apart. Then the two ends were connected by one running lengthwise of the bone. Then the leg was stretched until the ends of the fragments joined.

overlapped and a screw was put in. There was good union, no trouble from the screw and the patient walks without a lump. H. WIDMART OAK

Jacobs, C. M.: Observations on Bone Transplantation (Albee Method) for the Cure of Tuberculous Spine Disease. *J Am Med Ass* 915
in 400 By Surg. Gynec. & Obst.

Bone transplantation into the split spines of several contiguous vertebrae for the cure of Pott's disease is a valuable surgical asset. Surgery is used to better advantage here than in tuberculous joints elsewhere in the body; there is no danger of disseminating the infection into contiguous normal bone and there is no sacrifice of bone to effect shortening.

The author emphasizes the fact that he does not favor surgical measures in every case of tuberculous spine disease. The value of any plan of treatment in Pott's disease is estimated by its effectiveness in combating ultimate deformity.

Under conservative treatment recovery may be anticipated in an average period of three or four years with or without deformity depending often on the region of the spine affected. In cases of the middle and upper dorsal region the spine is frequently associated with great angular protrusion whereas in the cervical or lumbar region even when extensive has little or no kyphosis. In childhood therefore routine treatment should be protective except perhaps in middle and upper dorsal Pott's disease, but in cases in which conservative treatment has been tried and found wanting surgical intervention is justifiable. In adults, operative measures depend on social and economic conditions. Patients in the leisure class are in a position to choose between conservative and operative treatment. On the other hand, the wage earner must regain health in the shortest possible time; therefore conservative treatment in his case demands a sacrifice justified only by a necessity which Jacobs believes no longer exists.

In the middle and upper dorsal region of the spine where deformity has developed necessitating a pronounced bending of the bone insert the strain on the graft is greatest. Unless external support be given following the post-operative period of recumbency tracings of the spine will almost invariably show an increased rounded kyphosis. In lower dorsal or lumbar Pott's disease the graft is usually straight and the strain is mostly confined to its lower end. Here again it is necessary to use external support otherwise the lower part of the graft may not remain firmly anchored and then it stands out prominently.

Jacobs gives the ultimate results of nine cases operated upon during the year 1913. His conclusions are:

1. Surgical measures for tuberculous spine disease are a great improvement over conservative treatment but should be restricted to selected cases. Undoubtedly they shorten the period of disability

2. Not only may existing deformity be prevented from becoming exaggerated, but also deformity itself may be prevented by surgical measures.

3. Too early reliance cannot be placed on the strength of the bone graft. It takes time for the splint to become securely fixed by permanent callus.

4. External support must not be disregarded for many months following the operation otherwise deformity may ultimately occur.

5. Even with post-operative protective treatment for a period of six or more months the duration of treatment is much shorter than the average duration under non-operative methods.

6. Success of bone transplantation for the cure of tuberculous spine disease depends on the proper implantation of the bone splint into the diseased and normal contiguous vertebrae. Essential to the success is the careful protective after treatment.

Watson, C. G.: A Method of Amputation at the Ankle-Joint Which Leaves the Heel Intact. *Brit J Surg* 1915 11: 390.

By Surg. Gynec. & Obst.

The main principles of the operation are to leave the original walking surface of the heel intact and to preserve the malleoli; to amputate the foot in front of the os calcis, together with the astragalus to remove the cartilaginous surfaces of the lower ends of the tibia and fibula and of the upper surface of the os calcis; and then to wedge the os calcis between the malleoli and pin it there with an excision pin driven through the heel—the pin to be removed in about a fortnight.

The following advantages are claimed:

The patient walks on the original heel pad, which has been accustomed to carry weight and bear pressure.

2. A club shaped stump is secured by the non-removal of the malleoli which gives a firm hold to the uppers of an ordinary boot.

3. The shortening of the limb is reduced to a minimum—about an inch on an average.

4. No expensive artificial apparatus is necessary. An ordinary boot can be worn—a great advantage to hospital patients—if the sole is stiffened with a sheet of metal and a block is provided for the toes.

5. Owing to the original heel pad being left intact weight can be borne on the stump at an early date without risk of pain or undue pressure. The method may be employed in lieu of Chopart's amputation when this operation is possible without risk of backward tilting of the os calcis from contraction of the tendo achillis. Less skin is required for the dorsal flap than in Chopart's amputation and the stump is no less serviceable for walking.

Watson describes each step of the operation in detail and reports seven cases operated upon. In all these cases excellent results have been produced and the author believes that more serviceable stumps have been provided than could have been obtained by Syme's or Pirogoff's amputations.

R. O. RUTHER

Henderson M. S. Resection of the Knee-Joint for Tuberculosis. *J Am Med Ass* 1913 luv 140
By Surg Gynec & Obst

From his experience in the Mayo Clinic Henderson concludes that while in tuberculosis of the knee conservative treatment should be tried for a reasonable length of time in adults resection is usually the final solution. In this clinic they advise resection in all cases of proved tuberculosis of the knee even if but slight destruction of the bone is revealed by the X ray because even when but little destruction is shown there is often complete destruction of the articular surfaces and in none of the cases of this type has bony ankylosis been found on operation.

Previous to March 1913 67 cases were operated on with no operative mortality of these 37 were traced. The average age of the patient was 37 years and the average duration of symptoms before operation was 8 years. Thirty-two cases were classed as cured, 2 returned for amputation and 3 died subsequently from tuberculosis.

Henderson considers the preliminary treatment of great importance. He advises that the operation be done in the quiescent stage as there is less pain, swelling, edema and later sinus formation if this rule is adhered to. Extension with rest in bed is probably the best method of quieting this condition.

The Fergusson type of operation is used in the Mayo Clinic. A tourniquet is applied and removed before sewing up the wound. About one half inch of bone is removed from the tibia and one half to three quarters of an inch from the femur and the denuded surfaces are swabbed with iodine. If the patient's business requires much standing the limb is fixed in 10 flexion for those who sit most of the time 15° to 20° flexion is best. For fixing the bones a wire nail is driven up through the head of the tibia into the femur through a separate incision the head being left projecting through the skin so that it can be removed in two to three weeks. Plaster is used in fixing the limb the cast being removed in two weeks and a new one applied which is retained for six weeks to two months. Following this a stiff leg brace is used for from four months to a year depending upon the firmness of the ankylosis.

FRANK D. DICKSON

MacAusland W. R. Ankylosis of the Elbow. Four Cases Treated by Arthroplasty. *J Am Med Ass* 9 5 lx 312. By Surg Gynec & Obst

MacAusland reviews extensively the literature of the treatment of ankylosis by arthroplasty. The first operation was by Quenn in 1902. Various methods have been used to separate the joint surfaces including gauze wax and lanolin, very prosthesis muscle flaps, fat flaps, and fascia. He gives a rather detailed review of the experimental work by Wilson and Brooks on the use of transplants in arthroplasties. MacAusland believes that transplantation of fascia lata as used in his third and fourth cases is a procedure much more surgical in

appearance and with development in technique more satisfactory in final results than the use of prepared fascia or other membrane.

Four cases of arthroplasty for ankylosis of the elbow are reported.

In the first case a long incision was made and a flap of fat and fascia was transplanted. Although there was some necrosis of the skin due to poor circulation the result was good.

In the second operation the technique was similar to the first in this case also there was some necrosis and sloughing. The function was good.

In the third case MacAusland used a piece of fascia lata. He describes the operation in detail and illustrates it fully with excellent cuts. A U-shaped incision was made by beginning on the lateral aspect three inches above the elbow joint and passing over the olecranon. The ulnar nerve was dissected out. A cross incision was made crossing midway on the olecranon. The olecranon was sawed across and separated and the joint was broken open. With a saw and a shoemaker's rasp the lower end of the humerus was shaped as near like a normal humeral end as possible a piece corresponding to the olecranon fossa was removed from the radius. These surfaces were made as smooth as possible. The condyles were covered with the fascial flap and the tissues sewed in place. Passive motion was begun on the fifth day. The functional result was excellent.

The procedure and results in the fourth case were the same as in the third. ARTHUR O. REILLY

Tubby A. H. Nearthrosis or Arthroplasty. Notes on Some Cases. *Am J Orth Surg* 1915 xii 379
By Surg Gynec & Obst

Tubby gives a very complete and concise review of the subject of arthroplasty with a report of his results in a number of cases. He advises a very careful study of the case before attempting the operation. It had best not be done until growth is complete. The patient's stamina, physical condition and occupation should be carefully considered. It must be absolutely made certain that the cause of the ankylosis is entirely in abeyance. A careful radiographic study should be made of each case. He reports seven cases with fairly encouraging results. He thinks passive motion should not be started for at least three weeks after operation although active movements may be allowed earlier.

GEORGE I. BACH

Lovett R. W. The Use of Silk Ligament in the Ankle in Infantile Paralysis. *Am J Orth Surg* 9 5 45
By Surg Gynec & Obst

The author reports 60 cases in which 79 operations were done at the Children's Hospital. The silk used were of various sizes from No. 12 to No. 18 and of various kinds both twisted and braided. They were prepared by being boiled in water or by being dipped in bichloride or oxydized of mer

cury or paraffin. In the 70 operations there was infection in 11 cases in which the silk came out.

There were three different techniques used.

1 Perosteal insertion in which the silk is quilted to the periosteum.

2 The open bone method in which the silk is put through a hole drilled in the bone.

3 The subcutaneous bone method in which the bone drill is driven directly through the skin without an incision at the desired location.

Loyett prefers the open bone drill method because some of the cases in which the perosteal insertion method was used showed that the periosteum was torn away from the bone.

The author's conclusions are that the silk ligament operation in cases of drop foot from infantile paralysis is a useful operation attended by a good proportion of success that a most rigid technique is necessary and that prolonged fixation and support are necessary because the silk is not strong enough to hold up the foot itself but serves as the core of a ligament which is the real supporting structure.

LLOYD T. BROWN

ORTHOPEDICS IN GENERAL

Taylor H. L. Tuberculosis in Relation to Deformities and Their Prevention. *Post-Grad J* 19 5 100 21. By Surg. Gynec. & Obst.

Taylor emphasizes the importance of preventing deformities in tuberculosis of bones and joints. This is accomplished (1) by preventing the infection and (2) by combating or eliminating the deforming factors.

Since a considerable portion of tuberculosis in children is of the bone type it is evident that there should be a more strict control of herds, dairies and milk products.

Segregation of advanced cases of phthisis and disinfection of all tuberculous sputum is advocated.

By improving vigor and vital efficiency through better hygiene infection is combated.

The prevention of deformities in bone and joint tuberculosis depends upon an early accurate diagnosis and the careful planning and intelligent management of the treatment.

Fixation should be in the position of choice and the patient's activity should be limited.

Operative interference is more frequently indicated in adult than in children. The object in operative work is either to remove diseased tissue to fix the parts or both.

Terminal deformities of the extremities which in children or adult may be satisfactorily corrected by safe and comparatively simple operations.

R. B. CORFIELD

Gilbert J. M.: Infantile Paralysis. *Med J A Str I* 19 5 14, 4. B. Surg. Gynec. & Obst.

The author reviews the pathological findings and discusses the symptom noted in non fatal cases of infantile paralysis.

He states that infantile paralysis may affect any part of the nervous system but it has a tendency to affect the anterior cornua of the spinal cord and there is a question whether the peripheral nerves are affected or not.

He reviews the findings in detail of the Scandinavian physicians Harbitz and Scheele and describes certain common symptoms found in this disease and discusses their mode of production.

1 Where there is a tenderness of the muscles there are two theories as to the cause (1) peripheral neuritis (2) involvement of nerve roots in the meningitic process and invasions of the tracts conveying painful impulse to the spinal cord. Neither of these he believes to be a satisfactory explanation but he favors the theory of peripheral neuritis.

2 Where the paralysis is partly spastic and partly flaccid he believes the explanation to be simple and entirely satisfactory that this phenomena is due to an incomplete transverse lesion of the cord the disease affecting the lateral columns of the cord as well as the anterior though to a lesser extent the paralysis becoming purely a flaccid type when the inflammation in the cord has partially cleared. This was first and accurately described by Wickman. Another explanation given by Hughlings Jackson is that the cerebellum exercises a continuous influence on the muscles. When the lateral columns are injured the tonic influence asserts itself but under normal conditions it is kept in check by corresponding impulses of the cerebrum which have a restraining effect.

3 The exact meaning of the symptom of retraction of the head is doubtful. It is generally looked upon as a sign of meningitis when it affects the posterior cerebral fossa. It is thought that this position of the neck makes room for any accumulation of fluid in a posterior fossa but this does not explain its cause in infantile paralysis and other diseases of childhood.

He believes retraction of the head is best explained by the hypothesis of Hughlings Jackson published in 1871 which is in brief that Jackson believes that the cerebrum represents movements in the order of the trunk, leg, trunk, while the cerebellum represents them in the order of the trunk, leg, arm and the cerebral influence is dominant in the cerebellar extension so that when the influence of one is removed he other dominates. Applying this theory to infantile paralysis he supposes that the cortical structure at the highest levels in both the cerebrum and the cerebellum are very apt to be affected by this disease that the cerebral paralysis is manifested by coma and convulsions while the cerebellar paralysis revealed by retraction of the neck and rigidity of the limbs also that the order of paralysis is the same as in cerebellar paralysis the trunk predominating. The cerebellar influence on the trunk is maximal while the cerebral influence is minimal hence in the paralysis of both rigidity is dominant. He believes that the theory is correct.

by suitable treatment. The final effects are represented by muscular atrophy, loss of subcutaneous fat, deformities due to overpowering of the paralyzed muscles by their antagonistic unparalyzed muscles, flail like joints, and the occasional shortening of a limb.

Polio-myelitis may occur sporadically or as an epidemic. It is usually seen in the summer months. The period of greatest susceptibility is during the first two or three years of life. Owing to the nature of its onset it may easily be mistaken for the ordinary gastro-intestinal disturbances of childhood or any of the other acute infections. Early lumbar puncture will prove helpful in making differential diagnosis. During the first few days the spinal fluid is increased in quantity, is opalescent and shows an increase in the number of lymphocytes.

The physician should be very guarded in his prognosis as it is not always possible to judge the probable amount of residual paralysis from the severity of the onset. The mortality varies from 7 to 20 per cent in epidemics while about 5 per cent of the cases make complete recoveries.

The same precautions should be taken as for any infectious or contagious disease: rigid quarantine should be instituted for at least three weeks and subsequent house disinfection resorted to.

The treatment includes the usual medicinal and dietetic measures for any acute infection. In addition absolute rest in bed should be required with the protection of the sensitive parts and administration of 2 to 10 grs of urotropine several times a day.

The patient should be kept in bed as quiet as possible for at least a month. As soon as the condition is recognized the affected limbs should be

kept in as normal a position as possible by means of some retention apparatus. Not until the expiration of at least a month or in any event until all tenderness has ceased definitely is the massage, electricity and muscle training instituted.

D. FOREST P. WILLARD

Gelst. E.: Supernumerary Bones of the Feet. A Röntgen Study of the Feet of One Hundred Individuals. *Am J Orth Surg* 9 5 xu 401.
By Surg. Gynec & Obst.

The author divides the supernumerary bones of the feet into two groups: those which are important and those which are comparatively unimportant.

In the first group he includes (1) the os trigonum, (2) the os tibiale externum, (3) the os peroneale and (4) the os vesalii.

In the unimportant group are placed (1) the secondary os calcis, (2) the os intermetatarsale and (3) the os intercuneiforme.

He then gives a good description of these bones and draws the following conclusions:

1. That the findings of his X-ray studies of the feet of one hundred individuals about confirm the findings of Dwight and Pfister.

2. It is of extreme importance that the frequency of occurrence of these accessory bones be recognized by the surgeon as they not only have an academic interest to the anatomist but a knowledge of them is of vital importance to one who is engaged in the surgery of the extremities.

3. That these accessory bones occur just about as frequently unilaterally as bilaterally; an important fact not to be lost sight of by those engaged in roentgen ray work and others.

LOYD T. BROWN

SURGERY OF THE SPINAL COLUMN AND CORD

Funk, V. A.: Dermoid Cysts of the Sacrococcygeal Region. *Internat M J* 9 5 xu 53.
By Surg. Gynec & Obst.

Dermoids are congenital cystic tumors. The simplest are globular sacs lined with dermal cells, from which hair may grow and be shed to later work its way to the surface forming a sinus which usually persists for some time. Sequestration dermoids are most frequent in the sacrococcygeal region and may be mistaken for spina bifida. Those anterior to the sacrum—post rectal—are rare and frequently contain teeth. They are often not found until puberty. A swelling appears, becomes painful, breaks or is lanced with a resulting sinus. This condition must be differentiated from fistula in ano or a tuberculous sinus. The prognosis depends upon how early they are seen and on the treatment which is complete excision. Funk reports two cases which received permanent cure by complete resection of the sac and sinuses.

C. A. STONE

Sherman, H. M. and McChesney, G. J.: Bone Splinting in Vertebral Tuberculosis. *Calif St J Med* 9 14 xu, 485. By Surg. Gynec & Obst.

Hibbs and Albee promulgated two splendid methods of repair of tuberculous in the vertebrae. Results from external supports usually proved unsatisfactory. The author considers a brace that is invisible, impalpable, imponderable, indestructible and innocuous to be the ideal brace. He considers the results of the Hibbs and Albee operations come nearest to his ideals considering bone as a living tissue and when its pathology ceases repair being inaugurated at once. The stimulation of osteogenesis induces rigidity and strength but no encroachment is made during the operations upon the diseased area. The Hibbs operation uses all of the vertebra posterior to the articular processes, the lamina and spinous processes being used to secure osseous contact with the vertebra below. Greater surgical attack is necessary in this operation.

The Albee operation makes use of the spinous process only splitting it from tip to base and in incorporating a bone splint removed from a tibial shaft. Selective cases and spinal regions were selected for each operation. The Hibbs operation for the dorsal the Albee for cervical dorsolumbar and sacral regions.

The operations being considered from a mechanical standpoint the articular processes being the fulcrum the Albee operation gives a body of bone posterior to the articular surfaces hence greater leverage. A selection of either is suggested for every case followed by prolonged after treatment there is everything to gain and nothing to lose by operation. Results of operation on twenty-five patients show fairly definite results in seven results of the others varying between fair and no result.

H. W. MALTRAY

Farrell B. P. Hibbs Osteoplastic Operation for Pott's Disease. *J. Am. M. A.* 95: 131, 1908.
By Surg. Gynec. & Obst.

The idea of fixation as a cure is suggested by the natural process of ankylosis which is seen in studies of the healed kyphosis. The question is to determine the best method of causing such ankylosis artificially thus accomplishing in a few weeks the result obtained by nature in months years. From studies on the cadaver Hibbs in 1910 devised the following method. Longitudinal incision is made over the spinous processes and the periosteum laid back on each side from the spinous processes and laminae. The spinous processes are then partly fractured and each turned down so that the tip of one comes in contact with the fractured base of the one below. A chip of bone elevated from each lamina is used to bridge the space between the laminae. It has been found that there is an adequate amount of real bone at all ages and that transplanting from other regions is unnecessary.

In 1500 cases have been treated by this method.

at the New York Orthopedic Hospital. The ages of the patients ranged from eighteen months to forty-one years, and the duration of the disease from four weeks to thirteen years. Of the series 12 had psoas abscesses and 40 had increased reflexes, the number of vertebrae fused was from 5 to 14. 7 died from extrinsic causes, 4 were reoperated upon because an insufficient number of vertebrae had been fused. Of the others in all except 3 cases which were paralyzed when they came to the hospital all symptoms of Pott's disease have disappeared. Autopsy on 2 cases showed complete fusion of the spinous processes and laminae.

W. A. CLARK

Collins J. and Marks H. E. The Early Diagnosis of Spinal Cord Tumors. *Am. J. M. Sc.* 1915, 113: 63.
By Surg. Gynec. & Obst.

The authors report two cases of extramedullary tumor of the spinal cord each presenting an atypical symptomatology followed by a discussion of the early diagnosis of the disease.

The classical sequence of symptoms has been provided from the report of a number of cases during recent years to be far from uniform. Pain has been especially insisted upon as an early symptom. Of the two cases reported by these authors in one pain was entirely absent and in the second it was light. Other subjective sensory disturbances such as parasthesia and hyperaesthesia have been found to be rare. Pain also often does not correspond to the segmental localization of the tumor.

The authors consider that the essential element in the diagnosis is the fact of a gradually progressive motor and sensory spinal paralysis the upper pole of which varies slightly if at all. In every case of so called transverse myelitis the possibility of tumor of the cord should be considered. It is to be hoped that the day will soon come when exploratory laminectomy will be undertaken as readily as an exploratory laparotomy.

H. W. WILKINSON

SURGERY OF THE SKIN FASCIA AND APPENDAGES

Breze A. C. Keloid Formation in the Negro. *I. S. J. H.* 95: 181.

By Surg. Gynec. & Obst.

The keloid is frequently observed in tuberculous patients where glands have broken down and have healed in wounds healed by granulation. They may occur however after a minimum injury such as a piece of the earlobe. The keloid is characteristic of the sites of predilection.

The treatment of keloid and tuberculosis has been a little many are defined by some. Although the negro is susceptible to both tuberculosis and keloid although keloid may develop on tuberculous lesions although the neck and chest are common to Brenner challenges the view that keloid is limited to only part of a scar perhaps

a small portion argues against a mere fertility of the field for bacterial growth. The author believes the condition to be a tumor a fibroma of the keloid growing from the connective tissue of the derma. The usual ill secure speculating upon the causation of tumors, the author states that the underlying factor in tumor growth is the loss of an inhibitory force possibly by irritation. This regime is applied to the development of keloid. That keloid is more common in the negro than the Caucasian may be attributable in part to instability of equilibrium in growth shown by the relative frequency of congenital malformation in the negro. This inhibitory substance which is therefore a secret irritant may result in the overgrowth.

T. W. HARRIS

MISCELLANEOUS

CLINICAL ENTITIES—TUMORS ULCERS
ABSCESSSES ETC.

Moulin G. M. The Cancer Problem. *A. Surg. Phil.* 1935 1:1. By S. R. G. J. et al. Obs.

The author first raises the question: Is there such a thing as cancer? He then states that it cannot be separated from other tumors that there are borderline cases between cancer and sarcoma and again between malignant and benign tumors.

The start of all tumors is from apparently normal cells. These develop in an apparently normal manner up to a certain state when further development is arrested. Increase takes place but the cells never advance or do any work. If the arrest of development occurs when the cells are highly specialized further growth is slow and the tumor is benign. If the arrest of development occurs when the cells are embryonic in character further growth is rapid and the tumor is malignant. Such cells are capable of transplantation through blood or lymph channels. Purposeful growth is controlled by heredity. When this force fails purposeless multiplication takes place and tumor results. Failure of this force may be due to age, disease, injuries which interfere with normal tissue construction and arrested development of organs or tissues from freaks of nature or from artificial causes such as chemical or physical agents viz arsenic, soot, aniline, colors, cobalt, X-ray. Perhaps noxious substances may be elaborated in the body producing similar results. This may account for predilection in families. In some families heredity that favors which directs and controls growth is so strong that growth never allowed undue increase. In others the power is weak and liable to fail and growth becomes rampant. There are therefore two factors working together: one is arrest or weakening of the power of development, the other is local irritation. Masses of cells which never attain perfect form result and increase with a rapidity dependent upon the stage at which the development was checked.

T. W. H. M.

SERA VACCINES AND FERMENTS

Kohlhardt H. Effect of Abderhalden Cancer Serum (Ube d. W. K. g. des Abderhalden Krebsserums). *Fortschr. Med.* 1935 4:76. By S. R. G. J. et al. Obs.

The fact that the body itself forms defense ferments against pathologic conditions would lead to the conclusion that such ferments could be used therapeutically. Abderhalden and Luncienben had already performed experiments in injecting fluid from cancers directly into the animal. This method however was not without danger. Abderhalden has now adopted the method of produc-

ing protective ferments in the body of another animal and then injecting the serum obtained into the cancerous individual. He has had success in inducing the disappearance of the tumor in ten rats. In this article four cases of the use of the serum in human patients are reported. The effect of the serum is highly specific so it is best to use for the original injection a part of the extirpated tumor or its metastases. Where this is not possible the serum of the tumor patient is used. The anti-serum when obtained is tested for its katabolic effect on cancer tissue.

The first patient was a man of 63 in an advanced stage of stomach cancer. It was thought that he would soon die. On February 28, 2 ccm of carcinoma serum were given. Unpleasant effects resulting March 3, 30 ccm given. Appetite and sleep improved. Edema decreased. Further injections of 10 ccm each given were April 8, 15, 23, 20, 23, 24, 25, and 27. A remarkable increase in weight and general health followed and all clinical symptoms soon disappeared. The case is not regarded as cured for the patient's serum still katabolizes cancer tissue but he is so far cured clinically as to be able to continue his work.

The second case was a woman of 51 in an advanced stage of cachexia. She had a tumor in the left half of the abdomen as large as child's head. There was infiltration of the descending mesocolon. Radical operation was impossible and long continued treatment with radium mesothorium and roentgen rays was ineffective. Ten ccm of carcinoma serum were given on July 2, 3, 4, 5, 6, 8, 10, 11, and 12. The general symptoms improved in a remarkable way after the first injection. Vomiting stopped, appetite and strength increased, and the pulse fell from 120 to 130. 80 or 90 after the second injection. Local symptoms improved and the tumor decreased in size.

In addition to these two cases of clinical recovery the author reports two further cases that ended in death. They were in such extremely bad condition when treatment was begun that by other means was hardly to be expected. However, the microscopic examination of the tumors showed such a marked effect of the treatment on the tumor tissue that he regards them as even more conclusive of the good effect of the treatment than the clinical cases. A detailed report of the microscopic findings will be given in a later paper.

There were no bad effects and no less advanced cases he feels that the serum would have been great hopes of recovery. Anaphylaxis may be produced but he has never seen it. A serious danger it may be avoided by not interrupting the series of injections or if it becomes necessary to interrupt them they should be resumed with serum obtained from a different species of animal. G. G. S.

Orto R. and Blumenthal G.: Experience with Abderhalden's Dialysis (1st bru g n m t lem Abderhalden's Dialyserversfahren) Dr. i ch m d l i ch k 1914 1 1336
By S. R. Cyner & Obst

The authors describe a series of Abderhalden tests with the sera of 30 pregnant individuals and 40 non pregnant ones men and women. The non pregnant ones included 13 carcinoma patients 22 with other diseases such as syphilis metastyphils skin diseases tuberculosis pyosalpinx myoma ovarian tumors etc and 4 normal in individual. They conclude that a negative reaction almost certainly excludes pregnancy and that while the sera of pregnant women almost always katabolize placenta this has only a limited diagnostic value because other sera especially those of patients with carcinoma also give a positive ninhydrin reaction with placenta.

The serum of men with leukemia praecox gives a positive reaction always with it is often with brain but often also with placenta. Testes were also katabolized by sera of patient with other diseases and by the sera of pregnant women. Specifically the so-called primitive forms in the mouse family Abderhalden could not be demonstrated. A C S

Oeller H. and Stephan R.: Criticism of the Protective Ferment Reaction (kritik des schützenden Fermentreaktion) M d K 1914 1 1336
By S. R. Cyner & Obst

Oeller H. and Stephan R.: Criticism of the Protective Ferment Reaction (kritik des schützenden Fermentreaktion) M d K 1914 1 1336
By S. R. Cyner & Obst

The authors attempt to determine the validity of the protective ferment reaction in the diagnosis of typhoid fever. They examined 100 sera from 100 patients in the hospital and 100 sera from 100 healthy individuals. They found that the protective ferment reaction is not a reliable method for the diagnosis of typhoid fever. Almost all sera from healthy individuals gave a positive reaction, while only a few sera from patients gave a positive reaction. They conclude that the protective ferment reaction is not a reliable method for the diagnosis of typhoid fever. A C S

Müller A.: The Limitation of Organotherapy (die Grenzen der Organotherapie) M d K 1914 1 1336
By S. R. Cyner & Obst

The author discusses the limitations of organotherapy, particularly in the treatment of typhoid fever. He argues that organotherapy should be limited to the treatment of the acute phase of the disease, and that the long-term treatment should be based on the patient's general condition and the results of the organotherapy. A C S

we have to deal simply with a hypofunction of a certain gland this in of course function being compensated for normal condition result. But in most diseases the condition is much more complex it is not a question of excess or insufficiency of function but of disordered function so that the gland does not discharge into the blood its normal secretion either in too small or too large amount but a substance that is entirely foreign to the blood. The administration of gland tissue only result in a greater amount of this foreign product being discharged into the circulation.

The primary pathological condition is not in the gland itself but in some other gland or possibly in the nervous system. As the latter glands act to a certain degree antagonistic and maintain a normal balance in the body it is possible in some case of hyperfunction to administer the secretion of an antagonistic gland for instance in acromegaly which is due to hyperfunction of the hypophysis the administration of thyroidal glandular glands may be of value. But the only true organotherapy consists in the transplantation of a sound organ in the place of the diseased one. The giving of a preparation from a gland organ only a makeshift. A C

BLOOD

Youland W. L.: The Protective Value of Aqueous Extract (Basis) of Leucocytes in Acute Infection in Animal J M d K 1914 1 1336
By S. R. Cyner & Obst

Youland W. L.: The Protective Value of Aqueous Extract (Basis) of Leucocytes in Acute Infection in Animal J M d K 1914 1 1336
By S. R. Cyner & Obst

The author attempts to determine the protective value of aqueous extract of leucocytes in acute infection in animal. He found that the aqueous extract of leucocytes has a protective effect in acute infection in animal. He concludes that the aqueous extract of leucocytes is a valuable agent in the treatment of acute infection in animal. A C S

tible animals like the rabbit all the more unsuitable for such a determination. For these reasons more weight perhaps may be given the results of the present work. The possibility of leucocytes containing neutralizing substances within the meaning of immunity is remote. Leucocyte extract apparently everts its action upon animal infections only in the borderline type of infection and is with out curative value in more constant conditions.

GEORGE E. B. LISA

Jeger E. and Wohlgemuth J. A New Method of Controlling Haemorrhage of Parenchymatous Organs (Ein neue Method zur Stillung parenchymatöser Blutungen). *Arch f Klin Ch* 1914, cvii, 04. By Surg. Gynec. & Obst.

Jeger and Wohlgemuth point out the disadvantages of various previous methods of stopping hemorrhage in parenchymatous organs. The blood flows in such a broad stream that there are no contact surfaces to aid in producing coagulation. If the blood is divided into small streams by some fibrous substance interposed coagulation takes place much more readily. This may be accomplished by means of gauze, but the gauze tampon remains as a foreign body. They have devised an absorbable tampon. It is prepared from a delicate membrane taken from the intestines of sheep and cattle. This is frozen into a solid mass and then cut up in a machine resembling a microtome so that it is divided into very fine fibers. This is sterilized by keeping it three days in five per cent carbolic acid solution and then washed repeatedly with 70 per cent alcohol. When needed it is taken out of the alcohol and washed in salt solution and applied while still wet to the wound. It adapts itself perfectly to the wound and acts the same as any other tampon. Experiments on the organs of animals have shown both that the method of sterilization is effective and that very large amounts of the material can be used and perfectly absorbed.

A. Goss

Curtis A. H. The Treatment of Haemorrhage by Injection of Blood. *J Am M* 1915, 95, 111. 33. By Surg. Gynec. & Obst.

In the treatment of persistent hemorrhage Curtis again urges the employment of repeated injections of whole blood. The only apparatus required is an arm constrictor and a 20 ccm ground glass syringe coated with liquid vaseline. Upon withdrawal from the cubital vein of a healthy donor the blood is immediately injected into the subcutaneous tissues of the patient. Human blood is given preference over serum from lower animals because of certain objections to the latter, notably danger of anaphylaxis, possibility of tetanus, and a tendency to contamination when preserved. Whole blood is found to be fully as efficacious as human serum and can be used without delay and with less danger of infection.

In cases of continued hemorrhage of moderate severity—for example hemorrhage of the new

born—blood injection rivals transfusion in the results achieved and is the method of choice because it requires little technical skill. In infants with severe anemia intravenous injection of blood by means of a 100-ccm lubricated ground glass syringe is recommended as a worthy substitute for a transfusion operation.

A trial of hemotherapy in chronic anemias wasting diseases and infections with grave outlook is advocated. The author believes that the stimulating effect of repeated injections of blood offers more hope in this field than does the more difficult procedure of one or even two transfusions of large quantities of blood.

BLOOD AND LYMPH VESSELS

Honigsmann F.: Gunshot Injuries of Blood Vessels (Über Schussverletzungen der Blutgefäße). *Berl Klin Wochenschr* 1915, 52, 50. By Surg. Gynec. & Obst.

Honigsmann reports 9 cases of operation for gunshot injuries of blood vessels. 8 of them were for aneurism and one was for hemorrhage from a wound of the lower jaw. In 2 of the cases of aneurism there were diffuse hematoma in 6 there were sacculated aneurisms. In 5 of the cases there were also nerve lesions. Functional disturbances from contracture of the neighboring joints were tolerably constant. Four of the operations were undertaken on account of vital indications: twice operation for gangrene, twice ligation for secondary hemorrhage. In the other 5 cases the functional disturbances were regarded as sufficient to indicate extirpation of the aneurism.

Double ligation was performed in preference to suture of the vessels. Theoretically vessel suture would seem to be the ideal operation, but the old method has been found effective in practice particularly under war conditions.

Coenen and Henle have asserted that ligation may safely be undertaken when there is a satisfactory collateral circulation as indicated by the discharge of arterial blood from the peripheral artery after temporary ligation of the main artery. Von Frisch gives as a positive sign of sufficient collateral circulation a normal color of the skin of the periphery of the limb and the appearance of venous congestion when the circulation in the leading vein is cut off.

The author has found the Coenen-Henle sign reliable. Some authors advise medical treatment unless there are vital indications for operation, but Honigsmann thinks operation should be the rule on account of the disturbances in circulation produced by the aneurism and the danger of later growth and rupture.

A. Goss

Erdman S.: Wounds of Arteries. *N Y M J* 914, 6, 1261. By Surg. Gynec. & Obst.

Two cases of incomplete division of arteries are reported by the author. In each case temporary

hemostasis was followed by repeated profuse hemorrhages. The treatment which finally proved successful was the exposure of the artery and its ligation above and below the opening.

J. H. SMITH

SURGICAL THERAPEUTICS

Rohdenburg, G. L.: Colloid Silver with Lecithin in the Treatment of Malignant Tumors. *J. Med. Research* 19 5 XXXI 33.

By Surg. Gynec. & Obst.

Ten cases of absolutely inoperable malignant tumor in man were treated as part of this investigation. All diagnoses were based on microscopic examination of the tumors.

The mixture which the author made use of was prepared as follows: One gram of commercial colloidal silver was rubbed up with three grams of Merck's lecithin about five drops of water being added to facilitate the process; the ingredients being mixed together until a perfectly smooth uniformly colored mass free from grit was obtained. This was then dissolved in 30 ccm. of a 25 per cent aqueous carbolic acid solution and the fluid was filtered and sterilized by fractional sterilization. This mixture was given by intramuscular or intra-venous injection the average dose being 7 ccm. repeated every third or fifth day. No toxic phenomena were observed except a rise of temperature varying from one to three degrees and lasting about six hours.

In judging the results the standard of Weil was adopted namely actual decrease in the size of the tumor not referable to the ordinary course of the disease. The results were the same as with other methods that is the pain was relieved and the patients felt better both purely psychic changes. There was no question that the clinical appearance of the patients was improved some even gained in weight no doubt due to a psychic stimulation of appetite. The ulcerating surfaces of some of the growths cleaned up probably because of the greater surgical cleanliness afforded patients under constant observation in a hospital. All of these changes were so deceptive that those who had clinical charge of some of the cases were certain that they were benefited. Nevertheless all the tumors pursued their usual course grew steadily as shown by careful measurements and finally all the patients died demonstrating thereby the need for extreme caution in reporting the results of therapeutic efforts to effect malignant growths.

GEORGE E. BRIDLEY

ELECTROLOGY

Shearer, J. S.: Measurements with the Coolidge Tube. *Am. J. Ro. Ig.* 9 4 11 57.

By Surg. Gynec. & Obst.

The advent of a tube in which current and voltage may be dependently controlled marks a new era

in the scientific study of X radiation. Two factors determine the quantity and quality of radiation from a given tube—the voltage and the current. Increase of current at fixed voltage increases the quantity of radiation only but increase in voltage without change in current increases both quantity and penetration. It simplifies the interpretation of result if measurements are made at constant current and voltage.

Shearer gives seventeen curve charts of various measurements among which are the following. A seasoned Tungsten target ordinary tube showed in one minute a drop in voltage corresponding to a drop in penetration from about 8 Benoist to a little above 5 Benoist. The same tube after complete cooling starting at 39 ma. and 60 K.V. showed a drop in three minutes of from nearly 8 Benoist to 5. A Muller water-cooled tube starting at about 32 ma. showed a similar change in three minutes. A corresponding run with a Coolidge tube starting at about 10 ma. and 70 K.V. (Benoist 9) showed a maximum change of only about 0.3 of a unit Benoist. This shows the certainty of operation for treatment where continuity of quality is of the greatest importance.

The question of the proper design for transformers to be used in radiographic fluoroscopic and therapeutic work is of considerable interest. Some information in this connection may be secured by measurement of the actual performance of transformers with a tube as the load. Transformers were tested on a 20 volt line with heavy short leads to the transformer. The effect of even slight line resistance is very marked at high current and would be much greater with a 110-volt supply. The measurement of two transformers at about 40 K.V. showed them nearly identical but operating at 70 K.V. B will give 5.5 times as much roentgen radiation as will A. Thus for deep treatment A would be almost useless while B would do fairly good work.

In the test of fluoroscopic screens a considerable difference was shown. Several of the newer screens equal or surpass the P. B. C. DAWD R. B. 1242.

Fraenkel, M.: The Stimulating Effect of X Rays and Their Therapeutic Use in Chlorosis. (*Die Reizwirkungen des Röntgenstrahle und ihre therapeutische Verwendung bei Chlorose*). *Zentralbl. f. Gynäk.* 9 4 XXXIII 93.

By Surg. Gynec. & Obst.

Dysmenorrheic disturbances are frequent accompanying phenomena in young girls suffering from chlorosis. These disturbances which have been treated rather ineffectually with iron preparation the author states he has influenced rather successfully with X rays.

He treated a few such cases with hemoglobin of 48 to 50 per cent mild Basedow symptoms such as tachycardia general unrest extreme nervousness and slight enlargement of the thyroid basing his treatment on the following hypothyroidism. Bums

view that the infantile uterus develops only after ovarian function begins leads to the conclusion that in the absence of or in the presence of a hypofunction of the ovary the infantile uterus can persist. A case of A. Elliot proves that by means of ovarian corpus luteum extract an infantile regular menses and later fully developed ovarian follicles can be brought about so that pregnancy occurred one half year later in his particular case. The uterus in this case had developed to normal size.

Furthermore the experiments of Steinbrunn in feminizing males and masculinizing females likewise proved similar relationships. By implantation of ovaries into males he succeeded in developing their mammae so as to produce normal milk in fairly good quantity. He attributes this development of the mammae to the inner secretion of the implanted ovary.

In discussing Baschewsky's case he considers the gradual disappearance of menstruation and x-ray of the ovary of the case as that of a hypofunction of the ovary may be considered as a predisposing factor for the onset of slow disease. Analogous to this is the fact that the stimulus is a predisposing factor for the development of disease. In the total extirpation of the ovaries at operation. This is an indication which exceeds the low of x-ray should not be a stimulus without just cause. The conclusion must be drawn that in Baschewsky's case the ovaries function should be stimulated with the stimulus of x-ray to give especially in the form of treatment. This is especially indicated in those cases of myoma complicated with exophthalmic goiter. It is most desirable to begin with x-ray of the thyroid gland as the ovaries receive stimulating effect from the source of the meninges. In the treatment of exophthalmic goiter in which the patient developed all the typical symptoms in loss of weight to 70 pounds and the menses gradually disappeared and remained absent for eight months. A partial thyroidectomy was performed and the patient gradually improved. Menses returned and remained normal for four consecutive months. Six months later further symptoms set in as in the case of the ovaries again occurring. X-ray treatment of the goiter plus stimulating rays of the ovaries again caused an improvement with the return of the menses. There is no doubt in this case that the action of the x-rays was twofold, first reducing the goiter (measurement for 41 to 39 mm) with associated symptoms and secondly producing normal menstrual periods.

This observation on the one hand viz the fact that symptoms of Baschewsky's disease often make their appearance in chlorotic girls on the other hand that so many young girls suffer from chlorosis (which improves almost immediately after menarche) uninfluenced by iron therapy points to a hypofunction of the ovary as a cause of chlorosis. He has employed the treatment of stimulating rays to the ovaries in five cases, and was able by

this alone to raise the hemoglobin of these patients from 48 per cent to 78 or 80 per cent and in two cases even to 85 per cent. This offers a new field for x-ray therapeutics which the author believes will be of considerable value. L. A. JUCKE

MILITARY SURGERY

Schlossmann Secondary Hemorrhage After Gunshot Injuries (Ober Spital) Gen. Ach. Sch. (1915) Gen. Ach. Sch. (1915) By S. R. G. (1915)

One of the most unpleasant complications in military surgery is secondary hemorrhage after gunshot wound. These secondary hemorrhages are due either to secondary erosion of the blood vessel or primary injury of the vessel by the bullet on the field.

Hemorrhage from erosion is not unknown in civil surgery. In comminuted fracture one of the fragments may not be properly replaced. It exerts a continuous pressure on the vessel wall finally leading to pressure necrosis and rupture. There is much more opportunity for such erosions in war as comminuted fractures are more numerous and the fragments are more extensive. Long transportation is necessary causing a great jar of the patient. However this is only a secondary factor in the causation of secondary hemorrhage. Erosion is more frequently caused by extension of the suppurative process so that the vessel is the vessel wall leading to necrosis and rupture.

When hemorrhage from erosion arises in the veins this is less dangerous than when it arises in the arteries. The venous hemorrhage may stop spontaneously or be arrested by the physician. It is not necessary to stop bleeding and he is tempted to be satisfied with tamponing. The hemorrhage is apt to begin again just as spontaneously and lead finally to death or very severe anemia.

Flow of the great majority of secondary hemorrhages is due to primary injury of the vessel by the projectile. Modern bullet more or less move rapidly and have so much greater penetrating power than injuries of vessels and nerves are more frequent than formerly. A bullet may penetrate the blood vessel completely but the surrounding tissues may fill up the wound so that there is only effusion of blood into the surrounding tissues and hematomas or traumatic aneurysm is formed or there may even be no hematoma. The blood vessel may contract so as to completely shut up the opening. The intima rolls inward and the surrounding tissue plug up the wound and a thrombus is formed. In all such cases there is danger of secondary hemorrhage. Of course it is greater if there is suppuration in the wound.

The danger of such secondary hemorrhage lasts until the fourth or fifth week. Hemorrhages may take place even in aseptic wounds after the healing of the entrance and exit wounds.

The clinical picture in these cases is that of increasing pain and tension in the limb with nerve-pain and peripheral paresthesia and finally considerable oedema i.e. symptoms of pressure of an intramuscular hematoma on the nerves and veins. If the possibility of aseptic secondary hemorrhage is borne in mind and the course of the shot crosses the path of a vessel diagnosis is not difficult. Secondary hemorrhage from a false aneurysm that has not been observed or correctly diagnosed may give symptoms very like those of a large abscess. Several cases have been described in which such aneurysms were opened under the mistaken diagnosis of abscess. Schloessmann gives a history of a case of his own.

An important point in the treatment of secondary hemorrhage is to bear in mind the possibility of its occurring. The only certain and effective treatment is ligation of the blood vessel at the place of injury. Tamponing pressure and ligation at any other point are only makeshifts. A Goss

Frank J. Penetrating Gunshot Wounds of the Abdomen. *Chicago M Record* 94 x x 64.
By Surg. Gynec & Obst.

It is generally recognized by the civil surgeon that immediate operative interference gives the best results in cases of penetrating gunshot wound of the abdomen. However the line usually followed by military surgeons is conservative and operation is undertaken only for late complications or for signs of marked hemorrhage.

The arguments of the military surgeon are that (1) operative treatment in war time has proved disastrous as statistics show that all cases operated on were fatal (2) asepsis cannot be carried out in the field (3) the wounded cannot be cared for during the battle and (4) there is great danger of tetanus.

As to the first argument many of the deaths are in all probability due to factors other than the operation. The wounded are transported over rough roads and in many cases a day or two may elapse before treatment can be administered. During this time peritonitis has been developing and the operation is performed too late. As to the other arguments it seems to the author that with proper preparations these objections can be removed. In closing he makes a strong appeal for the same treatment of military wounds as that accorded wounds in civil life. J. H. SKILES

Hackenbruch. Treatment of Gunshot Fractures with Extension Braces. (*Erfahrung mit der Behandlung von Schussverletzungen mit der Streckung*) *MfM* 11 B 1 95.
By Surg. Gynec & Obst.

Hackenbruch describes the treatment of fractures with extension braces. He has treated 23 cases 16 of which were compound gunshot fractures the others simple fractures of the extremities. He has found from experience that these extension braces can be used successfully even in cases of

extreme comminution of the bones and extensive injuries of the soft parts. He has used them successfully in some apparently hopeless cases of severe injuries with grenades where it seemed at first that the limb would have to be amputated but he succeeded in getting the bones into good position and avoided amputation.

The standard for each end of the long brace is fastened solidly in the plaster cast then by turning a nut in the center of the brace the ends are pushed apart as far as desired. The extension can thus be regulated at any moment and the brace and cast are made light enough so that the patient can walk around while the fractured bone is knitting together the ends being held in proper position by the stretching of the segment of the limb.

The article has 18 illustrations showing the application of the brace to the arm ankle thigh and leg and the correction of a displacement of the long bones realized with it. The joints above and below are left exposed to permit the normal use of the limb. From almost the first the limb can be moved actively without pain so that men with badly shattered long bones are able to be up and about. A Goss

Noelte. Operative Treatment of Injuries of the Spinal Cord in the Field Hospital. (*Über operative Behandlung der Rückenmarksverletzungen im Feldlazarett*) *Deutsche med. Wochenschrift* 1905.
By Surg. Gynec & Obst.

Noelte describes briefly 20 cases of spinal cord injury 2 improved without operation 9 died of different complications without operation. Nine were operated on of which 2 improved to such an extent that there is reason to believe that they will be able to walk 1 improved after an abscess was opened 1 improved but the paralysis was little changed 3 were unchanged 1 died of meningitis 1 died of respiratory paralysis this was an injury of the lower cervical cord with ascending softening.

From his results Noelte agrees with Guleke that early operation in spinal cord injuries is justifiable. He does not perform laminectomy until the third day for there is a chance that during the first two days improvement will take place without operation. It is dangerous to wait longer on account of the probability of bladder infection. A Goss

Lewandowsky. The Injuries of the Nervous System. (*Die Verletzungen des Nervensystems*) *Berlin MfM* 11 B 1 94 190.
By Surg. Gynec & Obst.

Lewandowsky takes up chiefly the question of indications for operation. In injuries of the brain the results are much better with operation than without. Holbeck's statistics give a mortality of 14 per cent after operation as compared with 50 per cent in non-operated cases. Operation is especially indicated in tangential shots, for bone splinters are especially apt to be forced into the brain. Shots that enter the skull diametrically

frequently pass through the brain entirely without doing much damage. The chief indications in such cases is thorough cleansing to avoid infection and careful watching for later developments.

All cases of brain injury should be kept under observation for five to six weeks on account of the danger of meningitis or brain abscess. One can scarcely fail to notice the signs of meningitis but in brain abscess there is often no rise of temperature the general condition, intelligence and headache must be relied upon for the diagnosis. Injuries caused by shots may extend to the base of the brain and involve the nerves of the base especially the cochlear and vestibular with deafness and incoordination. The prognosis is relatively good as the soldiers are mostly young and strong but brain injuries may be followed by disturbances in speech paralysis and even traumatic epilepsy. Operation as a rule is not effective in these conditions.

Though operation is indicated in the majority of cases of brain injury it is distinctly contraindicated in spinal injuries. If the spinal cord is completely severed peritonectomy is of no good. It is only partially separated the chances of recovery are good with out operation as with it. The most important thing in the management of injury of the spinal cord is to avoid infection of the bladder and bed sores. Injuries of the cauda equina may be treated more like those of peripheral nerves.

Injuries of the peripheral nerves are extremely frequent and the indications for operation are difficult to decide upon. The neurologist frequently cannot tell whether the nerve is completely severed or not but in general if the paralysis remains stationary or grows worse for four to eight weeks operation should be performed. Operation consists in freeing the nerve from scar tissue then nerve suture or neurolysis. In general operation is not indicated implying a gain in the nerve. It is difficult to discuss the results of operation on nerves for the time has not been long enough. The beneficial effect of nerve suture often are not manifest for as long as eight months. The results of neurolysis become evident sooner but often being restored after two months. A. Goss

Tubby A. H. Nerve Concussion Due to Bullet and Shell Wounds. *B. J. M. J.* 35: 57.
By S. H. (3 Dec. 1914)

In reporting cases of nerve injury under his care at the Fourth London General Hospital Tubby states that it is a little difficult to gather what is the general acceptance of the vague term "concussion of nerve." He thinks the following definition may prove acceptable. It is damage done to a nerve trunk without actual destruction of the axons, cylinders and the damage may consist of an effusion of blood between the fibers following compression of the nerve against a bone by the rapid passage of a foreign body in the immediate neighborhood of the nerve. In other cases the actual lesion may not amount to hemorrhage but to a temporary

anæmia or its opposite hyperæmia of the nerve and specimens are required for microscopical examination before a precise diagnosis can be made. It is also possible to conceive that in certain large nerve trunks such as either of the popliteal nerves where the motor fibers can be split up for a very long distance from the sensory either a motor or a sensory bundle may be injured so that in one case motor paralysis alone may exist and in another sensory symptoms be present.

In all cases stereoscopic skiagraphs were taken. Where possible or practicable the shell fragment or bullet was removed especially if it was near some large nerve trunk. Tubby says these physiological paralysis will clear up. A partial or irregular paralysis of muscles supplied by one nerve trunk is indicative of a physiological blocking such as arises from a small hemorrhage in or around a nerve trunk or a bruising. A persistence of the reaction of degeneration is an indication for exploration of the nerve. While waiting for the power to return he emphasizes the necessity of relaxing paralyzed muscles e.g. wrist drop to hyperextend on a splint foot drop to flex the foot beyond a right angle. Massage and electricity should be given in these same positions. M. S. H. Gwynne

Bland Sutton J. The Value of Radiography in the Diagnosis of Bullet Wounds. *Brit. M. J.* 1914: 931.
By Surg. Gynec. & Obst.

Bland Sutton describes the Spitzgeschoss bullet used by the Germans. It is sharp-pointed and has a high initial velocity than bullets of an older pattern. It has a solid core of lead enclosed in a nickel cylinder efficient at the base. He emphasizes how necessary the use of the X-ray is in locating bullets which have some freak located themselves at some unthought-of spot a considerable distance from the point of entrance. Troublesome wounds are often caused by these Spitzgeschoss bullets striking a hard object first such as a stone before entering the victim. The nickel covering strips and is distorted into fanlike shapes causing extensive wounds erroneously attributed to expanding bullet. The author thinks that a bullet is better removed than left in but no hard and fast rule can be adhered to. The size of the skin wound is no indication of the damage sustained within. No attempt to ascertain the amount of damage done should be made by manipulation by insertion of a finger into the wound or by a probe. X-ray examination will infection pain and much misery. M. S. H. Gwynne

Rusca F. Experimental Study of the Traumatic Pressure Effect of Explosions. *Experimentelle Untersuchung über die traumatische Druckwirkung der Explosionen.* *Deutsche Zeitschrift für Chir.* 1914: 35.
By Surg. Gynec. & Obst.

Rusca discusses cases of injuries in war from explosions where there were no external injuries. Such injuries are evidently caused by a extreme

degree of compression of the surrounding medium air or water which then injures the body by pressure or concussion against it. In order to determine the nature and extent of such pressure injuries he performed a series of experiments on rabbits rats and fishes. The animals were placed in a half enclosed space and explosions produced by means of various explosives care being taken that the animal should not be directly wounded. The internal organs were then examined microscopically. These cases were characterized by the fact that there were numerous internal lesions without any visible external wounds. There was practically no difference between the effect of air and water both acting essentially like trauma from a blunt instrument.

Lesions of the central nervous system are often observed but generally they are not fatal. There may be brain lesions without any injury of the skull but a previous trephine increases the susceptibility of the brain to injury very greatly. Direct lesions as well as contusions from contrecoup were observed. Perforations of the tympanum and intra and extra ocular hemorrhages were frequent. Hemorrhages in the thymus heart and spleen were also often observed. In the liver kidney stomach intestine and diaphragm in addition to hemorrhage there were sometimes severe lacerations of the tissues. The lung being the most sensitive organ in all cases there were hemorrhages of the lungs on both sides and sometimes severe laceration of the lungs. The greater vulnerability of the lungs is due to the fact that they consist of elements that vary greatly in compressibility and thickness. This also explains the pronounced periarterial and peribronchial localization of the lung hemorrhages.

The fact that the hemorrhages which are moderate in degree are almost exclusively around the large deep lying arteries explains the fact that in human beings after compression of the thorax there are often no lung symptoms at first while later post-traumatic lung diseases develop. The cases of scalping in accidental explosions show that scalping can be produced by the current of air alone. In many cases the multiple internal injuries are sufficient to cause death while in others they were not great enough to produce sudden death. In these cases there must have been shock probably affecting the important centers of the medulla oblongata.

A. Goss

Hoguet J. P. Observations on Military Surgery
in the Early Weeks of the War. *J. Am. M. Ass.*
914 1221 94 By Surg. Gynec. & Obst.

During the very early weeks of the war many rifle wounds were clean. This condition however has become less frequent as the personal cleanliness of the soldiers on the march has become less. Shrapnel wounds are of course attended by a greater amount of infection because of the greater destruction and bruising of tissues. Saber and bayonet wounds are comparatively rare.

In rifle wounds involving bone two possibilities are present either the bullet makes a clean perforation of the bone or the bone is completely shattered. Shrapnel wounds are in general more severe than rifle wounds. These wounds are caused either by the shrapnel ball or by part of the casing of the shell. Wounds of the upper part of the body predominate over those of the lower.

J. H. SMITH

of the genital tract. These changes may be so slight as to attract no attention. It must be remembered that the spermatozoa head away from an acid and toward an alkaline medium. Constrictions of the genital canal may lead to a retention of the secretions with consequent inspissation to a degree which prevents the spermatozoa from making effective progress or the outward flow of the secretions may be so rapid as to prevent the passage of the spermatozoa past the constricted point. Stasis and infection may alter the secretions after they have been poured out. These various changes produce sterility without ill health.

Failures of ovulation are represented either by persistent corpus luteum or by distention of the ovary by retention cysts with thickening of the capsule. The presence of a persistent corpus luteum in the ovary inhibits pregnancy hence removal of this body is generally followed by the prompt appearance of pregnancy.

Distention of the ovary by retention cysts means that the ovaries have not been expelled. This with a thickened capsule prevents the expulsion of the ovary. Removal of the retention cysts is rarely followed by a recurrence of the same cystic condition.

Among the causes of hostile secretions are hyperacidity produced by the use of too much table salt with the food or by other forms of general acidosis. Such a state demands general medical treatment. The presence of bacteria in the vaginal secretions may produce purulence and hyperacidity. This condition is cured by most thorough disinfection.

While many of the minor cervical alterations can be corrected by minor treatment in many of them larger measures are needed to secure perfect drainage from the uterus and consequently from the tubes.

Curettage and disinfection of the cervix must be so thorough as to produce absolutely normal cervical retention. If the change in the secretion has extended above the cervix the uterine cavity must also be curetted.

The author notes that the uterine orifice of the tube has such a small lumen that very slight changes in this region may be responsible for sterility. He notes that congestion of the tube without apparent inflammation is extremely common. In fact, persistent corpora lutea are in the majority of sterile cases associated with imperfect drainage from the uterus probably as a result of consequent congestion. In many cases he advises obtaining proper uterine drainage by a suitable discussion of the posterior lip and division of the anterior attachments of the cervix.

In conclusion he states that great care is necessary to decide whether to advise the minor plastic operation only and to hold the conservative work on the ovary or tubes and ovaries in reserve for possible future use or to advise complete repair at one sitting.

S. W. BAIRD, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Herrmann E. An Active Substance in the Ovaries and Placenta (Über eine neue Same Substanz im Eierstocke und in der Placenta). *Monatsh. f. Geburtsh. u. Gyn.* 1915 xli 1.

By Surg. Gynec. & Obst.

Herrmann reviews the work of other authors in preparing extracts from the ovaries and placenta and describes in detail his method of obtaining in pure form from these organs an active principle that is a chemical entity. He separated the corpus luteum from the other constituents of the ovary so that it is purely a corpus luteum substance. The substances from the corpus luteum and the placenta are identical but a placenta contains a greater amount of it than a corpus luteum. It is a yellow oil that may be solidified by cold but otherwise remains a thick fluid. It turns brown in the air from oxidation; it is a cholesterol derivative soluble in alcohol, ether, acetone and benzol but not soluble in water.

The animal experiments in which he tested the action of the substance are described. In the course of preparing the substance before it was obtained in a pure form it had various injurious effects on the animals, but after it was obtained in a pure form it had no bad effect whatever. It had a very powerful effect in stimulating the growth and development of the sexual organs. Young animals 8 weeks old after five days' injections showed the sexual development of animals 25 to 30 weeks old. When the injections were continued changes similar to those of early pregnancy took place. The mammary glands of both male and female animals were powerfully developed. The substance also contributes to the development of secondary sexual characteristics. Its action proves that the development of the mammary gland is dependent on the secretion of the corpus luteum and placenta.

Macroscopic changes in genital organs after injections are shown by colored plates; the microscopic changes are also shown by figures. A bibliography of 60 titles completes the article. A. Goss.

Sanes, K. I. Torsion of Ovarian Cysts. Report of Cases. *Am. J. Obst. & Gynec.* 1915 lvi 76.

By Surg. Gynec. & Obst.

The author states that in 51 operations for ovarian cysts he had 9 cases of torsion or 17 per cent. He quotes the statistics of Schauta who found torsion of an ovarian cyst in 3 per cent and Hoffman in 9 per cent. Pfannenstiel while reporting an average of 20 per cent called attention to the wide variation of statistics from the 47 per cent in Kustner's clinic to 5 per cent in Martin's and explained this variation by the different degree of readiness with which patients apply for operative relief from uncomplicated ovarian cysts. Of 31 cases in which the number of births were specified 17 were multiparæ, 8 nulliparæ and 6 primiparæ. The most common age was between 20 and 40, the youngest

that this part of the ovary is preserved the longest in transplantation especially in auto- and homograft transplantation the author comes to the conclusion that in selected cases ovarian transplantation in women is justified

TORCOLLE

Wätjen J. The Histology of Purulent Salpingitis and Its Relation to Etiology (Über die Histologie der eitrigen Salpingitis und ihre Beziehung zur Frage der Ätiologie) *Beit. path. Anat.* 4: 18. 1904. 48 pp.

By Zentralbl. f. d. ges. Med. u. Naturh. Hist.

After considerable work on this subject in conjunction with Schlumpert the author decides with some limitations that there is a characteristic histology for the different forms of purulent salpingitis depending on their etiology. Unlike other authors especially Amersbach Wätjen observed after dilatation of the cervix with laminaria tent severe degree of inflammation with pronounced lymphangitis and phlegmonous inflammation of the wall of the tube. On chlamydial infection of inflammation caused by lymphoma hemorrhage.

Tuberculous lesions of the tube are generally recognized by their typical tissue changes only in very recent cases as they aptly be confused with other acute forms of salpingitis. Plasma-cells appear in the tissue of the tube in tuberculous lesions. Wätjen found no cutaneous salpingitis following acute appendicitis and of the tubo-ovarian which was probably due to the preceding severe appendicitis. The peculiar condition of the lymphocytes and plasma cells in the uterine gonorrhoeal tubes is that if gonorrhoeal infection is produced from the initial gonorrhoeal signs in the female from the histological picture

entirely disappeared but the pain persisted. When admitted to the hospital on February 1st her temperature was 37.0° pulse 100 skin pale. To the side of and behind the large uterus a fluctuating tumor could be felt. On November 18th there was a severe attack of pain and a decided increase in the size of the tumor which could be felt almost up to the umbilicus. The pulse was rapid and there was increasing anemia. On the next day laparotomy was performed. In the right ligament just above the right ovary a hamatoma was found a large as a child's head. The tube which was considerably thickened was enclosed in the hamatoma it was opened and drained. The patient had icterus after the operation. The temperature was subfebrile. In the ovary there was a large corpus luteum. In the tube no chorionplacental elements were found in the mucous cavity.

The pathogenesis of the case is not clear. There is no reason for assuming the origin of the hamatoma from rupture of vein in the broad ligament. Ovarian hamorrhages are always intraputrefactive. The pathogenesis suggests somewhat a hamatoma of the hamorrhagic salpingitis. A tubular pregnancy seems more probable. BRANT

Groothuis W. J. Varicocele of the Broad Ligament. *T. M. Verh.* 1905. 231 pp.

By G. J. G. A. & Obst.

The following is a fairly illustrative case. A woman 30 years of age complained of constant backache dull burning pain in the iliac region was in the last stage of labor on her feet and often extending upwards to the head. She was very nervous and irritable and was troubled with constipation. On examination the tumor was found to be enlarged retrocervically. It was

the broad ligaments the round ligament also being utilized by plication and anchored in the midline of the fundus anteriorly

The patient has been entirely well since the operation. On examination two years later the uterus was found to be in a normal position

EDNA D L CORVELL

EXTERNAL GENITALIA

Fabricius, J. Prmary Carcinoma of Bartholin's Gland (Über primäre Carcinom des Bartholinischen Drüsen) *W. I. A. f. G. u. h. G. y. d. k.* 94 169

By Zentralbl. f. d. ges. Chir. Geburtsh. d. Grenzgeb.

The patient was a 35 year old woman with carcinoma of Bartholin's gland on the left side. Radical operation with removal of the adjacent segment of the rectum was followed by recovery with rectal fistula. Later operation was performed for the fistula then one on the inguinal gland then on for recurrent tumor in the vaginal scar and still later another one on the inguinal gland. Finally there were metastases in the bone and the patient died five years after the first operation. *B. W.*

Gräber, J. M. Leucorrhoea with Special Reference to Treatment by Vaccines and Ionization *S. N. I. f. r. W. R.* 94 445

By Surg. J. & Obst.

The author goes into the general consideration of leucorrhoea. He finds the condition frequently associated with fibroid attack with rheumatoid arthritis and pyorrhea alveolaris. He refers to the cases associated with cross in mucopurulent discharge nabothian follicle large flabby uterus abnormally broad ligaments. He mentions cases in which the uterus was fixed and the fallopian tubes enlarged and tender or affected in the form of an acute or chronic abscess occasionally leading into the uterus.

Gräber advises three forms of treatment

1. Curettage followed by repeated irrigations on the principle of draining an abscess

2. Vaccination which as a rule produces a reaction and often improve the condition but is not in itself in the vast majority of instances sufficient to effect a cure. He places his greatest reliance on the method known as ionization

3. Ionization various solutions preferably a zinc solution are introduced into the vagina kept there by a mechanical appliance and used as a fluid electrode. The author states that he has no doubt that the fluid enters the tubes in very many cases. The current which he uses is of a strength of 50 milliampères for 5 to 30 minutes. He also uses zinc and copper intra uterine electrodes. With this method of ionization vaccines are administered at the same time. He finds that after a few treatments cultures from the uterus are sterile and that the vaccines no longer produce reactions

The author mentions the various forms of bacteria which he finds in leucorrhoea and believes that the symptoms of anaemia and toxæmia will disappear under the method of treatment which he advocates

S. W. HANDLES

Pozzi, S. Mobilization of the Rectum in Perineal Rhaphy for Complete Rupture of the Perineum (De la mobilisation du rectum dans la périnéorrhaphie pour rupture complète du pé. l.) *Rev. d'G. G.* 19 4 360

By Zentralbl. f. d. ges. Chir. Geburtsh. d. Grenzgeb.

Pozzi thinks that the suture of the anterior wall of the rectum is unnecessary in his method which he describes as follows

A transverse incision of the rectovaginal wall is made. Immediately above the border of the vagina a small cuff is formed in front of the newly formed anus. Two lateral perpendicular incisions complete the H-shaped incision. The levator is laid bare as well as the rest of the phincter ani. The anterior wall of the rectum is mobilized until its lower edge can easily be brought to the point where the new anus is to be formed. Buried sutures unite the levator the deep sutures at first being left untied. Solitary suture is used for the rest of the phincter the divided surfaces of the piravaginal tissue and the vagina are sutured. Rail suture is used for the anterior part of the anus and button suture for the newly formed perineum. If there is severe cicatricial contraction of the lower part of the rectum a posterior rectotomy must always be performed. After the operation a tube is introduced into the intestine and a strip of gauze into the vagina which is fastened over the new perineum through the deep sutures which have finally been tied over gauze pads. A permanent catheter is introduced. The bowels are kept locked for four days. A strict diet is enforced for eight days before and eight days after the operation. The fourth day after the operation a bowel movement is produced on the sixth day the deep sutures are removed and on the twelfth the superficial sutures.

The author claims priority in this method the essential point in which is the extensive mobilization of the rectum

FRANKENSTEIN

MISCELLANEOUS

Gibbons, R. A. Some Common Errors in Diagnosis and Treatment in Gynecology *Med. P. & G. R.* 19 5 322 65

By S. R. Gynec. & Obst.

In a concise and clear manner the author discusses the most common mistakes usually made in gynecological work. He is of the opinion that pregnancy and extra uterine pregnancy are frequently confused with other conditions. He reports several cases illustrating the fact that the absence or presence of menstruation does not necessarily indicate the presence or absence of pregnancy. In suspicious

cases where for some reason or other it is essential to make a diagnosis at once he suggests the use of the Abderhalden serum reaction which he thinks is of value in—

- 1 The early diagnosis of pregnancy
 - 2 The differential diagnosis between fibromyoma and pregnancy
 - 3 The diagnosis of chorio epithelioma
 - 4 For late puerperal sepsis where it is uncertain whether the uterus still contains placental remains
- The test he thinks is of great value providing gestation has advanced sufficiently far for he ferments to have become elaborated this may be as early as four but sometimes not until eight weeks

Believing that the most common error in diagnosis is frequently made in cases of extra uterine pregnancy the author mentions some of the most important signs and symptoms of this condition. There may have been cessation of one or two periods with or without the usual accompaniments of early pregnancy but more or less pain on one side is often complained of. The cessation may be followed in a few weeks by a continuous or intermittent colored discharge. In other cases sudden acute pain with collapse followed by rapid and increasing hemorrhage is an early symptom. On examination there may be found an alteration in the color of the vagina and a enlarged uterus rather larger than two months pregnancy and a swelling at the side of the abdomen. It is usually stated that the discharge of a distinct deciduous cast from the uterus without evidence of a focus is a characteristic sign of tubal pregnancy. This is as a rule true but it must be remembered that such a structure may occasionally be discharged without pregnancy being present.

WILLIAM D. PHILLIPS

Rohleder H. Dyspareunia in Women (D. D. p. 9, de W. bes. Arch f. f. k. L. 8, 9, 4)

By Z. Traub f. d. Gen. G. burt h. d. Gre. g. b.

Dyspareunia a lack of pleasure in coitus in women which occurs to 10 per cent of all women must not be confused with anæsthesia that is lack of sexual desire and frigidity. Sexual desire originates in the ordinary sexual enjoyment in the clitoris.

The etiological points are:
Deficient excitability of the pudendal nerve which innervates the clitoris
Deficient excitability of the genitocerebral ganglion also of the genitospinal ganglion
Interruption of conduction by tabes transversalis etc.

Deficient excitability of the clitoris is the most frequent cause of dyspareunia. It is due to an experience of the woman to defecation to partial vaginismus and to perverse libido. It may also be caused by certain forms of impotence in the male, premature ejaculation and by abnormal ties in the form of the penis.

The diagnosis is made—(1) from report of the

man in regard to sexual coldness of his wife and from reports of the wife in regard to sexual dissatisfaction of the husband (2) from immediate discharge of the spermatozoa after coitus as a result of defective orgasm and (3) from sterility.

According to Duncan 31 per cent of sterile women have dyspareunia.

The results are hypochondria melancholia hysteroneurasthenia vaginismus and sterility.

Electrical treatment of the clitoris should be used rather than the suggestion treatment.

MÜLLER CARION

Roulet A. de The Occupational Factor in Diseases of Women. Med. Rec. 915 lxxv. 97.

By Surg. Gynec. & Obst.

That women do not well endure the strain and hardships of industrial occupations is shown by the low birth rate and the high death rate and the frequent subnormalities both in size and weight which characterize the children of working mothers.

On account of her more delicate physique a woman is not fitted for work requiring long continued physical endurance. A woman under twenty cannot work continuously for ten hours a day in the most sanitary shop without serious injury or without jeopardizing her chance of future usefulness as a woman. Neither her mind nor her body is fully developed and the long hours the monotonous work the chronic exhaustion the often unhygienic surroundings to say nothing of the strain of existence on insufficient pay are not conducive to physical or moral well-being. Labor saving machinery has added to the burdens of the working woman since the machine is now used as a means of speeding up production at the expense of the worker's health and strength.

Certain trades are specially undesirable for women such as those requiring long continued standing working in a stooping or bent position lifting heavy weights operating heavy machines violent trawling work or exposure to extremes of temperature steam dust poisonous dusts and vapors etc.

Women do not bear well the strain of long continued standing as is required of sales girls press feeders and a large proportion of laundry and factory workers. Prolonged standing not only exhausts the worker but it places an unnecessary strain on the arches of the feet and on the ankle predisposes to curvatures of the spine and is a factor of considerable importance in the development of downward and backward displacements of the uterus of pelvic congestions and of the various menstrual disorders. Varicose veins of the vulva and legs are common in young women while varicose veins and ulcers are even more common in older women.

In girls from 14 to 20 years old prolonged standing and violent trawling work such as is required in operating stamping and perforating presses foot power printing presses and certain laundry ma-

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Loizeaux L. S. Surgical Diagnosis and Treatment of Extra Uterine Pregnancy *J Am Inst Homoeop* 19 5 vii 796 B3 Surg Clin & Obst

The author suspects tubal or ruptured ectopic abortion in all cases of supposed inevitable or in complete abortion when the collapse and pallor of the patient are out of all proportion to the amount of blood lost. He believes in such cases where curettage does not give sufficient gestation debris to account for the hemorrhage or condition of the patient that they should be looked upon with grave suspicion. A very good sign of much blood in the cul de sac is a subnormal temperature sublingually and an elevated temperature rectally.

There can be no doubt that the physician who most often suspects extra uterine pregnancy in unilateral pelvic conditions in women during the child bearing age will make few serious errors in the diagnosis of this condition.

The policy of blaming the danger of ruptured ectopic pregnancy on shock instead of hemorrhage and arguing against the risk of superimposing the shock of operation upon a patient already in shock—in other words temporizing—is dangerous in two ways (1) it influences the surgeon to consider delay (2) and most important it gives the general practitioner the idea that he is justified in temporizing until a more suitable or convenient time for operation.

Late operations for extra uterine cases are prone to be followed by slow recoveries and partial invalidism by reason of septic conditions, adhesions and inflammations consequent to infection or organized blood clots and the products of conception.

It is the author's firm conviction that a ruptured extra uterine pregnancy should be operated upon at the earliest possible moment after the diagnosis has been made and proper conditions and surroundings for laparotomy may be secured. His conviction is based in part upon a series of 15 personally operated upon without mortality in the Flower Hospital as soon as the diagnosis of extra uterine pregnancy was definitely well established. The fact that the patient was in collapse and suffering from internal hemorrhage did not warrant any more delay in the cases not so desperate.

When a diagnosis of ruptured ectopic pregnancy is made or strongly suspected at a time when the uterus before an operation or proper facilities for operating can be secured the following measures are advised:

1 Do not raise the blood pressure and increase hemorrhage by stimulation. This is not the time to place for trychnine or alcohol.

2 Do not give active cathartics or enemata or hot applications over the abdomen.

Morphine should be used hypodermatically to quiet pain and excitement combat the shock and act as a gentle stimulant.

Saline may be used per mouth per rectum or subcutaneously but never intravenously until the bleeding vessel is controlled.

The patient should lie in absolute quiet with the foot of the bed slightly elevated. External heat should be applied to the extremities and the body with an ice cap over the lower abdomen.

The conclusions briefly stated are:

1 Diagnosis is often obscure and should always be suspected in unilateral pelvic conditions associated with pain.

2 The time of operation should be at the earliest moment following diagnosis that proper facilities and surroundings for laparotomy may be arranged for.

3 The route of attack except in rare cases should be by laparotomy.

4 Sterilization of healthy tubes is not justified.

5 The removal of unhealthy tubes is justified even though not a menace to health.

EDWARD L. CORNELL

Walther F. Febrile Abortion with Special Reference to Treatment (*Ueber febrile Abort mit pyelische Beschaffenheit der Eizellen*) *B3 Geb 14 Gy 42 94 14 15*

B3 Ze t bbl f gis Gynäk Geburtsh d Grenz g b

A report with tables is given of the cases of abortion observed at the Strassburg clinic for the past five years with special emphasis on bacteriology and treatment. There were 834 abortions, 134 of which were examined bacteriologically. From his results the author does not believe in expectant treatment and prefers active treatment in all cases in which the tissues around the uterus are not plainly involved. In 50 per cent of all febrile cases the fever promptly declined after the uterus was emptied, 46.2 per cent of these after the use of the ureter which is so despised by Walther's opponents.

At the Strassburg clinic there was great disappointment with expectant treatment. Too long waiting may have serious consequences as many case show. If active treatment is used early the results are very favorable. If secondary diseases have begun the mortality is much higher. This shows that active treatment early as possible is justified.

The author comes to the conclusion that it is better to empty the uterus early and as gently as

possible and not to be afraid of the curette even with hemolytic streptococci. To wait for auto-immunization (Traugott) is useless for experience has shown that there is no such thing with streptococci. I. L. VACH

Szelitzky: Anterior Vaginal Hysterotomy in Artificial and Spontaneous Abortion. (Hysterotomie a vaginal anterior bei künstlicher und spontaner Unterbrechung der Schwangerschaft). *Zeitschr f. Geburtsh u. Gynäk.* 94. By Zentralbl f. d. ges. Gynäk u. Geburtsh. d. Grenzgeb.

Szelitzky reports 6 cases of vaginal hysterotomy, 4 times in late abortion and once each in missed abortion and hydatidiform mole. He discusses the methods of stimulating pains in abortion and premature delivery. Metrorrhagia is not very successful in the early months of pregnancy and is sometimes dangerous. In a case of spontaneous abortion in the sixth month metrorrhagia caused circular rupture of the cervix. Laminaria dilatation also has its fruits: the author once observed separation of the cervical mucosa which came out with the laminaria.

Up to the tenth week dilatation with Hegar's dilator followed by curettage is sufficient. In later months anterior vaginal hysterotomy is the method of choice. It is indicated in diseases which demand artificial abortion such as tuberculous diseases of the lungs and heart, pernicious vomiting and other toxicoses of pregnancy in pathological changes in the cervix and in cases where the use of conservative methods does not further the process of delivery. The author does not attempt to settle the question of whether anterior vaginal hysterotomy is indicated in septate abortion. JENTNER

Plique A. F. Pernicious Vomiting of Pregnancy and Its Treatment. (Le vomissement nauséabond de la grossesse et son traitement). *Bull. méd.* 94. 25. 1914. By Zentralbl. f. d. ges. Gynäk. u. Geburtsh. d. Grenzgeb.

Pernicious vomiting of pregnancy is a complication that is frequently quite dangerous for both mother and child. Among 200 cases collected by Pinard 80 mothers died, none of whom had had abortion performed nor came to the hospital in extremis. There were 40 recoveries after spontaneous abortion, 40 after artificial abortion, and 40 recoveries after the usual methods of treatment. The treatment consists in regulation of diet, suggestion, administration of medicines, and treatment with organic extracts and serum. Artificial abortion is a last resort. ECKELHORN

Jung, P. Treatment of Threatening Hemorrhage in Pregnancy. (Behandlung bedrohlicher Blutungen in der Schwangerschaft). *Deut. k. med. Wochenschr.* 1914. 41. 889. By Zentralbl. f. d. ges. Gynäk. Geburtsh. d. Grenzgeb.

Hemorrhages in pregnancy may arise from abortion tumors of the cervix, and rupture of varicose

cuscles in the vulva and vagina. As long as there is any considerable bleeding from the uterus the remnants of the abortion which cause it must be removed even if there is fever. The emptying of the uterus should be done with the index finger but without any scratching with the nails. The use of instruments, curettes or abortion forceps is not a livable on account of the danger of hemorrhage. If a myoma is causing the hemorrhage it should be removed if it has a pedicle. The stump of the pedicle must be well cared for. If the tumor does not have a pedicle the capsule should be split, the tumor enucleated and the bed carefully sutured.

The danger of abortion after the operation is slight if the uterus is not handled much and a firm tampon is not applied. Contractions of the uterus should be prevented by suppositories of morphine. In operable cases of carcinoma the uterus should be extirpated without any regard for the pregnancy. Hemorrhage in inoperable carcinoma should be controlled by excoriation and cauterization.

Radium treatment may also be useful in pregnancy to overcome hemorrhage and ichorous discharge. If arteries of an extremity rupture a ligature should be placed around them and they should be covered with compression bandages. The vessel should be ligated bare later and double ligation should be performed. If varices in the genital rupture they should be compressed with a sponge; then if possible ligation should be attempted if this fails ligation should be done *en masse* and compression accomplished with a T bandage. Bz. rwn.

Kubinyi von: Teratoma of the Ovary and Pregnancy. (Laparotomy (Teratoma ovarii) bei Gravidität (peritonie)). *Zeitschr. f. Gynäk.* 94. 25. 1914. By Zentralbl. f. d. ges. Gynäk. Geburtsh. d. Grenzgeb.

Laparotomy was performed on a 27 year old patient because of a rapidly growing ovarian tumor in the second month of pregnancy. The tumor was a teratoma of the right ovary and a radical operation was performed on account of the malignancy of the tumor although the left ovary appeared normal. Microscopically a beginning teratoma was demonstrated in the apparently normal ovary. Teratomata are extraordinarily malignant especially in producing metastases. REZENIA

Wolff, P., and Zade, M. Diagnosis and Prognosis of Kidney Changes in Pregnancy. (Zur Diagnose und Prognose der Nierenerkrankungen bei Gravidität). *Monatsschr. f. Geburtsh. Gynäk.* 94. 25. 1914. By Surg. Gynec. & Obst.

Among 3,477 deliveries from 1909 to 1913 there were 66 cases of severe disturbance of kidney function that is about 3 per cent of the cases. Fifty two of the cases were eclampsia, 21 of them nephropathy, 6 graviditis—kidney disease arising during pregnancy and caused by it—31 cases of chronic nephritis and 2 that could not be definitely classified.

The majority of the cases of eclampsia were in primiparae and a slight majority of the cases of *nephropathia e graviditate* also but the majority of cases of chronic nephritis were in multiparae.

Wolff and Zade conclude that with our present methods of examination the different forms of kidney disease during pregnancy cannot always be differentiated with certainty. During the puerperium and later a chronic nephritis may develop from a *nephropathia e graviditate* or from an eclampsia.

There is a predisposition to recurrence of *nephropathia e graviditate* in later pregnancies. Albuminuric retinitis is observed in pure nephropathy and in eclampsia. In chronic nephritis during pregnancy albuminuric retinitis has not the bad prognosis that it has when occurring outside of pregnancy. The retinitis may be caused by nephropathy complicating the nephritis and may disappear with the former at the end of pregnancy.

A Goss

Zoeppritz B Pregnancy and Nephrectomy

(S h w a n g e r s c h i t t u n d N e p h r e k t o m i e) Z i k f
of Ch 9 4 48

By Zent 1 bl f d ges G j k G burish d Grenzgeb

The author discusses the relation between the urinary system and pregnancy in general and between diseased urinary organs and pregnancy in particular. Based on an enormous collection from the literature and 18 cases operated upon and observed in Hummel's clinic, he gives an exhaustive discussion of the prospect for pregnant women who have had nephrectomy performed either before or during the pregnancy and also the outlook for the child. He concludes that if the other kidney is normal the dangers for neither mother nor child are as great as has formerly been held. There is no increased predisposition to nephritis in pregnancy and no greater danger of the kidney being affected by tuberculosis or other infectious diseases after extirpation of a kidney for tuberculosis or pyonephrosis if a long enough time has elapsed between the nephrectomy and the pregnancy. Also after a sufficient length of time and after a careful examination the resumption of marital relations may be permitted. If a patient who has had nephrectomy performed becomes pregnant she should be kept under careful medical observation.

K. Kise

LABOR AND ITS COMPLICATIONS

Nebeaky O Delivery in Contracted Pelvis is at the

Innsbruck Obstetrical Clinic for the Last Fifteen Years (I G burileist g bei gem B k n de i br u ker geburthilf che bl k n de let t s j hren) 1 k f G j dk
9 4 395 By S r g Cynec & Obst

During the 5 years from 899 to 1913 15,998 women were delivered at the Innsbruck clinic of whom 673 or 10.5 per cent had contracted pelvis.

Detailed accounts with tables are given of the various expectant and operative procedures used with the degree of contraction in the various cases and the mortality for mother and child. The following conclusions are reached.

In both premature and full term deliveries an effort should be made to deliver with the head presenting. If the size of the pelvis permits the delivery of a mature child at all it is best accomplished with head presentation. The mortality in breech presentation is ten times as great as in head presentation.

Prophylactic version should be rejected in the transverse position version should be external and by the head. In primiparae and contracted pelvis of moderate degree expectant treatment is to be preferred 78.1 per cent of the cases were delivered spontaneously.

If the history or pelvic measurements indicate that spontaneous delivery is not possible cesarean section is the best operation for both mother and child. It should be performed prophylactically that is either before or immediately after the beginning of labor pains. It was performed in 21 cases of the series.

The transperitoneal cervical incision of the uterus is to be preferred. If the case is not clean the child should be sacrificed for the sake of the mother. In many such cases high forceps may save the child from a mutilating operation. If cesarean section is refused artificial premature delivery is the next choice.

Spontaneous premature deliveries with children weighing from 200 to 2500 gm do not endanger the child at all hence artificial premature delivery is a logical operation. With present methods operations on the uterus are more dangerous for the mother because of the possibility of infection and premature delivery more dangerous for the child because its course after induction is often not normal.

A Goss

Kocks J Prolapse of a Hydrosalpinx Following an

Attempted Forceps Delivery (Hydrosalpinx prolapsiert d h Za gen ersuch) Z i bl f G j dk
9 4 48 11 1002 By Surg Cynec & Obst

The author reports what appears to be the first case of prolapse of a hydrosalpinx following a rupture of the vagina incident to an attempted forceps delivery. Following the application of forceps by a colleague a smooth glistening white mass suddenly prolapsed. This mass was about 5 cm thick and was mistaken for a prolapsed bowel by the attending obstetrician. In consultation Kocks diagnosed the mass from its narrow white glistening surface and tense walls, a prolapsed hydrosalpinx although he had never seen one before. As a result of the attempted forceps delivery the mass had entered the vagina through a rupture in its wall. The forceps had been removed and the head of the child was still in the inlet. To verify the diagnosis he incised the wall of the

mass and a large quantity of light mucus escaped. A few ligatures were used to tie the mass which was then ligatured. Forceps were then reapplied and the still living child extracted. All this was done in the patient's home with a few drops of chloroform as an anesthetic without further exciting the patient in the least. Complete recovery resulted.

L. A. JUNEAE.

Bench R. M. Twilight Sleep. Am Med 1915 2
37 By Surg Gynec & Obst

The author takes up the subject in considerable detail and cites the following conclusions:

In the first series of 50 cases at the Jewish Hospital Brooklyn the following results were procured: complete amnesia 84 per cent, partial amnesia 10 per cent, partial failures 6 per cent, and absolute failures none.

Twilight sleep is a reality. By its means 80 to 90 per cent of all women on whom it is used can be given a painless labor. It has many advantages to the mother, practically no disadvantages to the mother, and the fetal mortality is less than that by the old method. Also it is a method which requires extreme patience on the part of the trained obstetrician and a minute attention to detail. Each case must be individualized to get good results. Twilight sleep does not claim to be a panacea for all women in labor as the great bulk of the women of the middle class who are delivered in their private homes by the family physician at a moderate fee will not be able to demand the attention and detail on the part of a trained man to procure this treatment. However, in hospital practice under the proper surroundings and given intelligently, twilight sleep is a scientific reality and will become used more and more as a part of the armamentarium of the expert obstetrician.

FORBES L. CORRELL.

Hellman A. M. How Can the General Practitioner Use Twilight Sleep? Am Med 1915 2
37 By Surg Gynec & Obst

So far most of the work has been done in hospital but many men have tried it out so the author feels sure that before long all men doing any considerable amount of obstetrical work will feel able to superintend a twilight case. A dark quiet room is of great importance and the average city hospital is the most difficult place of all in which to obtain this. He doubts if the freedom of some twilight hospitals all over the country is ever completely true, even then there will be some women who will find it necessary to have their confinement take place in their homes. The paraphernalia needed consists of the usual sterile linens, the usual forceps and other instruments that should be on hand at every confinement, a good assistant or specially trained nurse and the doctor always within a call.

The author believes that twilight sleep is safe (1) in the hands of the specialist and (2) in the hands of the general practitioner if he will give the subject a little extra study and the patient the necessary

care. By being thus safely used in the home as well as in the hospital it certainly should grow to be generally used.

EDWARD L. CORRELL.

Price N. G. Side Lights on the Twilight Sleep of Gauss. J. W. Soc. M. J. 1915 21
By Surg Gynec & Obst.

The author describes in detail the physiological action of scopolamine and reviews carefully the results and opinions from various American and European clinics. He states that in 1907 Gauss (Kronig clinic Freiburg) reported 1,000 cases with excellent results; the following year Kroenig reported a series of 1,500 cases in which one woman died from rupture of the uterus, one child died during delivery and three others died in the first three days after delivery. He claims that the mortality under scopolamine was less than without its use. On the other hand he states that Hochstein reported 100 cases in which the death of one child was directly attributable to scopolamine. Following this it was not until the recent favorable report of 5,000 cases by Gauss that the medical men began to reinvestigate the virtues of twilight sleep. Among the results in recent administrations are the following:

Harris and McPherson in a series of 100 primiparae found 66 completely amnesic, 30 had a hazy recollection but were analgesic, 4 were too far advanced and 20 failed to respond altogether. They had three stillbirths and 17 forceps deliveries.

Kronig reports 125 cases, of which 104 had complete amnesia and analgesia, 9 were analgesic but not amnesic, 12 failed to respond and 15 had forceps deliveries.

Heller reports 150 cases with no stillbirths and no postpartum hemorrhages.

Williams of Johns Hopkins is quoted as saying that in two separate series his results were not satisfactory but that he expected to give it a further trial next year.

Prof. Green of Harvard favored morphine narcosis in 1903 but later abandoned it for two reasons: viz (1) it occasionally caused fetal asphyxia and (2) it required too much care for its safe administration.

In a series of 20 cases the author states that his results were fairly satisfactory. He states that as an analgesic scopolamine acted more or less markedly in every one of the cases. As a somnifacient 16 cases responded and 4 an amnesic only 10 cases were completely so, 3 had merely a hazy recollection and 3 remembered all the incident distinctly. Scopolamine acted most favorably on those cases which were under its influence no longer than six to eight hours. Because of secondary inertia it was necessary to resort to forceps in 3 cases, all primiparae; in 2 cases an epiotomy was done to prevent laceration of the perineum. In a nephritic case a primipara the use of scopolamine was abandoned on account of explosive vomiting; this was the only case which gave signs of gastric irritation. The baby of this parturient died 3 days after delivery with

symptoms of subdural hæmorrhage which was most likely due to a prolonged second stage. This was the only fatality in the series. **WILLIAM D. PHILLIPS**

Boldt H J Some Personal Experiences with Scopolamine and Morphine Narcosis. *Am Med* 915 x 35 By S rg Gynec & Obst

The author briefly reports his impressions of the use of scopolamine and morphine in general surgery and states that as a preliminary narcotic when conduction anesthesia or local anesthesia are to be made use of he knows of no agent which is more desirable. At the same time he sounds a note of warning against its use in instances in which inhalation anesthesia is to be used. He cites two instances of death from respiratory failure which were he believes attributable to the use of scopolamine and morphine. To utilize this combination similarly to morphine and atropine or morphine alone preliminary to the use of ether as has been done for many years it is advisable to give but one dose about half an hour before the intended time of operation. He further suggests that the dose be from one eighth to one sixth of a grain of morphine with 1/200 to 1/50 of a grain of scopolamine hydrochloride according to the size of the patient.

He considers this preliminary narcosis is especially preferable in neurotic individuals and in patients who may have organic disease of the respiratory and circulatory organs. **EDWARD I. CORLELL**

Heller J Some Remarks on the Advantage of Scopolamine and Morphine in the Management of Labor. *Am Med* 915 58 By S rg Gynec & Obst

With judicious use and with proper precautions the method is safe and free from danger to the life and health of the mother or child. The fear of asphyxiation of the child post partum hæmorrhage and psychosis in the mother have no foundation and if any of these accidents do occur it is not because of the method but because the method could not prevent them.

The disadvantages of the method are entirely with the accoucheur and not to the mother or child. It requires his presence at the bedside from the time the treatment is undertaken until the completion of labor not so much because of a danger but to keep the patient quietly under anesthesia on a line midway between consciousness and unconsciousness for if she allowed to go above that line several statements he will have several so called hysterical fits and will be able to draw a picture of her labor in her mind and thus lose the benefit of the treatment.

The contraindications to the method are (1) primary nrt (2) expected short labor (3) a marked disproportion between the fetal head and the mother's pelvis necessitating a major obstetrical operation (4) placenta prævia or a accidental hæmorrhage (5) absent or doubtful fetal heart

sounds and (6) active eclamptic convulsions where a rapid delivery is deemed advisable.

The treatment is exceptionally useful in neurotic women with a low power of resistance and in sufferers from heart disease. It is also of service in threatened eclampsia although it raises the blood pressure slightly. **EDWARD I. CORLELL**

Davis E P Analgesia and Anesthesia in Labor. *Am J M S* 95 cxlix 57 By S rg Gynec & Obst

The author reviews briefly the various methods in use for relieving the sensation of pain in labor and suggests the following. During the first stage of labor thorough emptying of the bowel by hot high enema frequent emptying of the urinary bladder the use of bromides by the mouth quiet if possible and comfort for the patient if it can be secured. Should these measures fail and the patient be threatened with exhaustion from irritation morphine and atropine should be given hypodermatically. During the second stage of labor when suffering is severe and uterine contractions are irregular and evidently lessened by suffering strychnine 1/60 to 1/30 gr digitalin 1/50 to 1/100 gr codeine 1/4 to 1/2 gr are given together hypodermatically. This dose may be repeated in an hour. When expulsion is imminent a small quantity of ether is inhaled during the pain at the moment of expulsion ether is given freely.

Davis states that this treatment has given good results and is followed by no untoward symptoms on the part of the mother or child. He suggests that those interested in the subject of spinal analgesia will find in Gellhorn a paper read before the American Gynecological Society an exceptionally clear and accurate statement concerning this matter. Gellhorn gives as his indications for spinal analgesia in gynecological operations any contraindication for inhalation anesthesia and it is the author's opinion that this agrees with conditions present in obstetrical practice. **WILLIAM D. PHILLIPS**

Bandler S W The Use of Pituitary Extract in Obstetrical Practice. Some Critical Observations on Twilight Sleep. *Med Rec* 95 lxxx 55 By Surg Gynec & Obst

Bandler considers pituitrin one of the most potent aids in obstetrics. He calls attention especially to its use in the conduct of the average complicated case. He administers it to the multipara before engagement or dilatation of the cervix and claims to rarely spend more than two hours at the bedside of a multipara in labor. After the ejection of pituitrin it is risky to leave the patient at bedside. In primiparae he regularly uses this drug to complete a slow second stage and has nearly obviated the use of forceps thereby. He uses pituitrin to supplement the action of the B. M. bag in the induction of labor thus saving the insertion of larger sizes.

In the post partum stages he occasionally uses pituitrin to hurry involution. He does not consider

clamps is a counterindication to its use. He finds it of value in overcoming bladder atony. In cesarean operations the drug is injected as the abdominal incision is made.

WILLIAM H. CRAW

PUERPERIUM AND ITS COMPLICATIONS

Spiegel R.: Puerperal Tetanus (*Tetanospasmi*)
Arch f Gynäk 1914 11 367

By Surg Gynec & Obst

Spiegel reports four cases of his own and collects all those published in Europe since 1885 and a part of those in America. He gives a table of treatment and results in all the 66 cases. In spite of the fact that the puerperal uterus is a suitable medium for the development of the bacilli and on account of its abundant blood and lymph supply offers favorable conditions for the absorption of the toxin the disease is so rare that it is often not correctly diagnosed and the patients die with a diagnosis of convulsions from puerperal fever or eclampsia.

As the disease is caused by a toxin that attacks the motor regions of the central nervous system, the most rational treatment is high intravenous and intralumbar injection of serum. 400 to 100 units at a dose to neutralize the toxin circulating in the body and not yet fixed in the nervous system. If no serum is available, the progress of the intoxication can be limited by blood letting followed by lumbar puncture and the injection of salt solution. Adrenalin injections are also said to have an inhibitory effect on tetanus toxin.

The place of origin of the toxin must be excluded as far as possible by cleansing the wound and by douching and curetting the uterus. Seventy per cent alcohol is the best fluid for douching as the toxin is precipitated in the alcohol. After the curettage and douching the uterus is tamponed with an antitoxin tampon. Symptomatic treatment should be given for the convulsions the best method being the intraspinal injection of 5 to 10 ccm of a 1 per cent solution of magnesium sulphate.

A. Goss.

MISCELLANEOUS

Hüsey F.: A Simplified Method of Performing Abderhalden's Pregnancy Reaction (*Die einfache Ausführung der Schwangerschaftsdiagnose nach Abderhalden*) *Zentrbl f Gynäk* 9 4 221
 By Surg Gynec & Obst

The firm of Hoechst has succeeded in making a dried placental albumin put up in small tubes of 0.5 gm and 25 gm to do away with the laborious method of preparing the placental albumin. For each test one little tube is used. The substance has been tested by the author with the ninhydrin reaction and has been found satisfactory corresponding in 28 cases with the original method. The only disadvantage found is the fact that the fine powder adheres to the dialysis shell and is removed with difficulty. To overcome this the firm is now making a powder of a coarser grade.

The advantages are self evident and if sufficient tests prove the reliability of the substance a more general application of the test may be looked for.

L. A. JUNKER

Labh rdt, A.: A Frequent Early Sign of Pregnancy (*Über ein häufiges Frühzeichen der Schwangerschaft*) *Zentrbl f Gynäk* 9 4 221
 By Surg Gynec & Obst.

The author describes a sign of pregnancy occurring as early as the fourth or fifth week even before the livid discoloration of the vagina. It consists of a transverse band livid in color running from one lesser labium to the other in the region just below the urethral opening. The author believes that it is due to a congestion of numerous small vessels running between the bulbi vestibuli on either side. These vessels lie directly beneath the mucous membrane and during the hyperæmia incident to pregnancy are the first to show the congestion. Although this is not necessarily due to pregnancy it is like the livid discoloration of the vagina, an early sign which may be of considerable value in numerous cases.

L. A. JUNKER

Each P.: A New Skin Reaction in Pregnancy, Some Remarks on the Work of Engelhorn and Wintz (*Über eine neue Hautreaktion in der Schwangerschaft, einige Bemerkungen zu der Arbeit von Engelhorn und Wintz*) *München med Wochenschr* 1914 11 2115
 By Zentralbl f d. ges Gynäk. u. Geburtsh. u. Grenzgeb.

The author reported similar experiments two years ago consisting in intracutaneous injection of fetal serum fluid expressed from the placenta and albumin or globulin precipitated from this. The results of these experiments showed at most a quantitative difference in the reaction of pregnant and non pregnant individuals. He secured the same results with cutaneous vaccination, which he thinks is far inferior to the intracutaneous. He thinks it remarkable that the placenta prepared by Engelhorn and Wintz cannot be used for intracutaneous injection while they got such extraordinarily favorable results from it by cutaneous vaccination. He can only attribute this difference in the results to the peculiar methods used by Engelhorn and Wintz in preparing the extract of placenta which they have not yet described.

ALBRECHT

Giusti G.: The Decidual Reaction in the Cervix and Adnæ and Pelvic Peritoneum During Uterine Pregnancy. Its Mod of Origin (*La reazione deciduale collo dell'utero negli annessi al peritoneo pelico e nelle l. g. idanz uteri suo modo di produzione*) *G. eccl. ital* 9 4 693

By Zentralbl f d. ges Gynäk. u. Geburtsh. u. Grenzgeb.

The decidual reaction is produced by morphological elements which are similar to the decidua of the body of the normal pregnant uterus and which like the latter undergo the same transformation.

tion cycle The reaction is due to the secretion of lutein substance which also stimulates the formation of decidual elements outside the mucous membrane of the uterus but only at those places which are subjected to special stimulation

The decidual reaction is observed most frequently during the last third of pregnancy it is entirely lacking or occurs only to a slight degree before that time The reaction is most frequent in the cervix more rare in the ovaries and pelvic peritoneum and it is lacking entirely or occurs only rarely in the tubes The elements of the reaction originate from the connective tissue of the stroma origin from the perithelium could not be entirely excluded

GATTORNO

Gentili A: The Internal Secretion of the Decidua

(Über die innere Sekretion der Decidua) Z

Ibid f GJ 4k 9 4 111 39

By Surg Gynec & Obst

Schottlander is of the opinion that the decidua plays an important rôle in the formation of protective ferments which split up placental albumin In this manner he believes the paradoxical reactions that is the positive reactions in the non pregnant can be explained Many authors have proved that decidual changes analogous to those occurring in pregnancy occur in the uterine mucosa during the antenatal phase If we consider that an analogy exists between the antenatal state and the pregnant state and if we believe that the decidua of pregnancy is the source of fermentative activities then it becomes plausible to believe that many paradoxical (positive) results of Abderhalden's reaction must be attributed to the antenatal period in which these women are The above mentioned protective ferments would also depend upon the various elements of the ovaries during their periodical monthly activity or during pregnancy On the basis of this theory Schottlander attributes an important internal secretory function to the decidua He therefore does not attach much significance to the theory of Veit and others that the production of ferments is due to the migration and absorption of chorionic villi elements throughout the body Although he has no proofs he speaks of the morphologic similarity of lutein and decidual cells of their similar development of the renewed secretory activity of the elements after termination of pregnancy in which the glandular epithelium takes on the form of large epithelial lutein cells

This corroborates in theory the work of Gentili on the internal secretion of the decidua brought out some time ago According to him there is still other proof of an internal secretion of the decidua viz that the decidua changes during pregnancy not only at the time of implantation but also grows from it within a wall as out of the uterine mucosa The existence of an internal relation between the normal course of pregnancy and the presence of corpus luteum has not been generally admitted as to the difference

between the clinical and experimental evidence In guinea pigs however a destruction of the corpora lutea causes an interrupted pregnancy whereas this never or only very rarely is the case in the human The explanation may be that the internal secretion of the highly developed decidua may act vicariously for that of the corpus luteum whereas this is impossible in guinea pigs in which there are usually multiple corpora lutea and a poorly developed decidua Furthermore the view in regard to the characteristics of the decidual cells is supported by the discovery of the *glande endocrine myometrial* in animals This has been still further corroborated by injections of decidual extracts, possessing characteristics and producing actions in animals similar to those produced by the usual organic extracts Toxic doses produce a thrombosis intravascularly less than toxic doses increase the resistance against poisonous extracts and lastly the acutely fatal action of this extract can be inhibited by the addition of an equal quantity of homologous serum Entirely independent of the toxic effect of decidual extract there is always a marked action upon the blood pressure producing a sudden drop Very small less than toxic doses produce this effect Corpus luteum extracts produce the same phenomena—but with much less intensity—which are entirely independent of the general toxic action of organic extracts Decidual extracts have a similar action upon the frog's heart

L A JUNE 18

Zuckmayer F: Woman's Milk During the Early

Period of Lactation Its Influence on Its

Composition of Increased Administration of

Calcium and Phosphoric Acid (Über die

milkbildung erst in der Laktationszeit und den Einfluss

von Kalk und Phosphorsäure auf die Milch-

zusammensetzung) J k f d g Phv d 9 4

I u 200

By Zentbl f d ges Gynäk Geburtsh u f rensgeb

In order to study more accurately the question of whether it is possible to increase the richness in calcium of mother's milk by giving calcium during pregnancy or post partum Zuckmayer performed a series of experiments giving pregnant and puerperal women tricalcium or colloidal tricalcium phosphate casein with their food and analyzing the milk chemically On examining the milk of 6 women for the first ten days of lactation excluding the first 13 he found great individual variations in the calcium and phosphoric acid content which could not be equalized by giving additional phosphoric acid after delivery or during the last two months of pregnancy But if given throughout pregnancy there was undoubtedly a direct effect on the milk in contrast with the cases in which they were given later did cry The calcium content decreased about 10 per cent and the number of acids which the milk contained was more than 0.4 g per kg was 1.24 l about 10 per cent The values for phosphorus were 1.1 mg a l ash was 1.0 increased

Williams, J. W.: *Imitation and Possibilities of Prenatal Care*. *J. Am. M. Ass.* 1915 1st of May. By Surg. Lynce & Obst.

Prenatal care is complicated and inextricably connected with the work of the obstetric hospital. It is not merely a matter of a few visits by a nurse to the patient in her own home. It involves in the coordination of the medical nursing and social service resource of the hospital and an effort to obtain such treatment and supervision for the mother as will offer the greatest possible guarantee for the safe delivery of a normal child which can be kept healthy by maternal nursing.

The foundation of the paper is the study of 703 fetal deaths which occurred in 10,000 consecutive admissions to the Obstetrical Department of the Johns Hopkins Hospital—6,500 indoor and 3,500 outdoor cases. In this series all deaths occurring in children born between the seventh month of pregnancy, the so-called period of viability and full term have been included as well as those occurring within the first two weeks after delivery. For convenience the children were classified as premature or mature according as their weight varied between 1,500 and 3,500 gm. or exceeded the latter figure. Of the 703 in this series 334 were in the former and 371 in the latter category.

These figures are somewhat less than the total mortality as they do not include many children who died later. Furthermore it must be borne in mind that they do not necessarily represent the results which may be obtained in private practice but are based on the material entering a large general hospital which includes many women who had been improperly treated at home and were admitted to the hospital in deeper distress.

Moreover the material differs from that of many institutions in that 4,600 of the 10,000 mothers were colored, thereby making it possible to compare the influence of certain causes of death in the two races. The statistics are of unusual value for two reasons. First that every one of the 7,000 fetal deaths in the series has been carefully described and subjected to routine microscopic examination—a procedure which sometimes yields most important information and secondly that most of the dead babies were subjected to autopsy.

The striking feature of the investigation are the syphilitic by far the most common etiologic factor concerned in the production of death presenting an incidence of 64 per cent.

Toxemia including eclampsia, nephritis and occasional rare conditions which are usually regarded as the condition *par excellence* which can be influenced by prenatal care is the cause of only 6.5 per cent of the deaths and consequently is accountable for only one-fourth as many as syphilis.

Notwithstanding most painstaking investigation the cause of death could not be satisfactorily explained in 11 cases or 1.5 per cent.

The death rate is notably twice as high in the blacks as in the whites 9.4 and 5 per cent respectively.

and equals or exceeds that of the whites in all but three categories, namely toxæmia deformities and placenta previa.

Regarding prenatal care in syphilis the author states that mere education in sexual matters can do but little good for the class of patients concerned. What is necessary is to recognize the disease in the mother at the earliest possible moment and then subject her to appropriate antisyphilitic treatment in the belief that the drug administered to her will be transmitted to the child and effect its cure. The difficulty lies in making the diagnosis. Not more than one-fourth of the women present lesions. In the remaining three-fourths the condition is usually unsuspected until a dead child is subjected to autopsy or a living child develops symptoms of hereditary syphilis. The Wassermann test is out of the question because of its expense. The birth of a dead baby should always be regarded with suspicion.

In syphilis the intelligent application of prenatal care in its broadest sense offers great promise of better results. Fetal abnormalities and excessive size or abnormal presentation of the child cannot be detected or remedied by the most intelligent prenatal nurse. Their recognition will be possible only after all women are educated to go to a competent obstetrician or to a well regulated obstetric dispensary for a preliminary examination a month before the expected date of confinement. If abnormalities are found the woman should enter a hospital for delivery and the public should be taught to realize that safety can be found only in a well organized obstetric hospital. Too many instances of omission and commission are now created by the hospital roof and in many the sense of security is illusory as the woman may be treated by short-term assistants who are often less competent than the much maligned practitioner. These women should not be deterred in their own homes by a doctor or midwife or even by the out-door service of the hospital as their safety and that of their babies depends on the expert service which can be obtained only in a well regulated hospital.

Prenatal care and instruction offer great possibilities for the diminution in the number of deaths due to prematurity. In her visits to the homes of ignorant and overworked women the prenatal nurse can prevent many premature labors by giving instruction in personal hygiene, insisting on rest and abstinence from excessive work during the later months of pregnancy and where imperfect nutrition is manifest by putting the woman in touch with appropriate agencies for relief.

For some years the prevention of toxæmic conditions has been recognized as one of the main functions of prenatal care and has accomplished great good. Every practitioner knows how difficult it is to induce even intelligent women to send specimens of urine for examination at regular intervals and that it is practically impossible in the type of women who come to the obstetric dispensary. Consequently none of the most important functions

of the prenatal nurse is to follow up the patients in this regard and when abnormalities are detected to see that the women enter the hospital for prophylactic or curative treatment.

In an obstetric department such as indicated the prenatal work should be conducted primarily from the dispensary which should serve as the portal of entry for all prospective patients irrespective of whether they expect to be treated in the hospital or in their own homes.

The first requisite for such a dispensary is that it should have proper quarters, an ideal personnel and adequate financial support. The purely medical work should be under the direct supervision of the director of the hospital and should be carried out by medical men who are sufficiently well trained to make a reliable diagnosis. A considerable proportion of them at least should be assistants living in the hospital in order that the work of the indoor and outdoor departments may be satisfactorily coordinated. In addition to the medical assistants the necessary number of nurses should be in attendance to care for the ordinary needs of the patients but more important is the requisite number of prenatal nurses. These should be graduate nurses with considerable obstetric experience who have also had a certain amount of training in social service work.

Patients should be encouraged to go to the dispensary as early as possible in pregnancy. After registration a careful physical examination should be made and its results recorded. This should not be limited to purely obstetric conditions but should include the entire body with especial reference to syphilis and tuberculosis and the condition of the kidneys. At this visit blood should be withdrawn for a Wassermann test should anything in the physical examination or the previous history of the patient indicate its necessity.

If everything is apparently normal and the patient desires it she may be tentatively registered as an outdoor patient to be eventually delivered in her own home otherwise she should be registered as a prospective hospital patient.

In either event she should be instructed to report to the dispensary at stated intervals so long as she remains well and to bring a specimen of urine at each visit. She should also be given a card containing concise directions concerning the hygiene of pregnancy and mentioning the important untoward symptom which might supervene. Should such be noted she should report at once.

At the first visit to the dispensary the prenatal nurse should arrange to call on the patient at her own home within a week. At this visit she should make a social survey of the surroundings and determine whether the patient is a proper object for charitable aid. If the surroundings are not suitable the patient should be persuaded to enter the hospital voluntarily. The nurse should also amplify the practical instruction concerning the hygiene of pregnancy and impress the woman with the necessity of suckling her baby.

After this initial visit an important part of the duties of the nurse is to keep track of the patient by means of a card index and in case she does not return to the dispensary within one week of the appointed time to visit her again in order to a certain why she failed to keep the engagement.

Every patient should return to the dispensary for a final examination one month before the expected date of confinement and the decision as to whether she is to be delivered in the hospital or in her own home will in great part depend on the findings at that time. In the latter event she should be visited again by the prenatal nurse in order to ascertain whether the necessary arrangements have been made for the approaching confinement. Ordinarily further visits will not be necessary until after the child is born but a visit should be made just after the student and post partum nurse cease their visits. This is necessary partly to check up the work of the outdoor service but principally to put the patient and her baby in touch with the children's clinic with instructions to take the baby to it should necessity arise and on returning to the hospital the nurse should register the child at the children's clinic or with the milk fund nurse so that it can be followed up by the proper agencies.

In the case of patients entering the hospital for delivery the prenatal nurse's work usually ceases with the visit made one month before delivery as the subsequent supervision will devolve on the nursing staff of the hospital. On the day before the discharge the mother and baby should be taken to the children's clinic for registration so that the baby may be under its supervision for the next year.

Prenatal care does not necessarily end here as it is necessary to take thought of what may happen in future pregnancies as well as of the preservation of the general health of the mother. Consequently when the existence of syphilis is not discovered until after the birth of the child a mechanism should be developed which will ensure proper treatment either under the auspices of the obstetric service or in some special department of the hospital. To bring this about without unnecessarily going into details concerning the disease will often require great tact and will tax the resource of many nurses. Furthermore when patients are discharged with conditions ultimately requiring operative treatment but which could not be undertaken during their stay in the lying-in ward an attempt should be made to see that they ultimately return to the hospital department or to some other department of the hospital for the necessary preparation both for the row and for that of the unborn children.

F. W. AND L. COR. 11.

Lovegren F. Further Blood Findings in Melaena Neonatorum (W. ter E. ter E. Melaena neonatorum) *Jahrbuch für Kinderheilkunde* 94: 1913: 708
D. Zentralblatt für Gynäkologie und Geburtshilfe

In the first case the bleeding began at the end of the second day of life and was a very severe hem-

orrhage threatening life After an injection of gelatin it stopped The restoration was comparatively quick in spite of the preceding severe collapse In the second case the bleeding began at the end of the third day It was a relatively mild case of melena The treatment was expectant the recovery spontaneous

The blood findings in the first case showed that the coagulation time slowed during the hemorrhage the red blood cells showed no tendency to rouleau formation and showed certain morphological changes such as early thorn apple forms and differences in size These changes disappeared after the retrogression of the symptoms of melena Rouleau formation gradually became normal morphological changes could no longer be seen the coagulation time was shortened The author is inclined to think that the disturbance in coagulation and the morphological condition of the red blood cells stand in a causal relation to the origin and course of the disease The blood findings in the second case showed rapid and good rouleau formation no morphological changes of the red cells coagulation time not slowed

Lovegren explains the difference in the two cases by saying that the defensive forces of the body were weakened in the first case and were only called forth or strengthened by the treatment while in the second case the body had protective forces at its disposal at once These blood findings are in accord with the clinical picture of the disease and with the pathological anatomical changes found in it so that they tend to support the hypothesis according to which melena neonatorum is caused primarily by a change in the coagulation chemistry of the blood These findings may be useful in the future in determining the prognosis and treatment of the disease

DISCUSSION

Reinhardt E: Contagious Pemphigus Neonatorum (Über Pemphigus neonatorum contagiosus) *Zfchr f Geburt u Gynäk* 194 LXVI 4
By Zentralbl f d ges Gynäk. Geburt u d Gynäzgeb

Reinhardt reports 23 cases of pemphigus neonatorum which were observed in the course of six months The course in the majority of the cases was tolerably benign and the skin affection recovered spontaneously in a short time but three children died from a general infection through the denuded corium One child with umbilical hernia and ectopy of the bladder died later of pneumonia There was a 2 per cent mortality

A detailed description is given of this infectious disease the nature of which is not yet clear it attacks only the newborn never the mothers or adults The author discusses the pathological anatomy the clinical course of the disease its differentiation from syphilitic pemphigus, the question of the exciting cause which is not yet known the post mortem findings in the children who have died and the treatment The best treatment is abundant powdering of the vesicles and especially the exposed corium with dermatol and banding the affected parts of the body with Bardeleben's bismuth bandage for burns

MOELLER

Holt L E and Babbitt E C: Institutional Mortality of the Newborn *J Am M Ass* 9 5 1917
By Surg Gynec & Obst

Ten thousand consecutive births at the Sloane Hospital for Women in New York form the basis of this report These cases occurred during a period of 17 and one-half years ending October 1913 They were divided as follows

Abortions	253
Stillbirths	439
Living births	9,318
	10,000

This hospital receives but few waiting women nearly all are admitted after labor has begun Patients are regularly discharged on the fourteenth day and complete mortality records are therefore possible only for this period In many cases infants who were ill premature or not thriving were kept for a longer time Some interesting facts regarding hospital mortality during a period longer than fourteen days are presented in this report

The total deaths occurring in the first fourteen days were 291 these being 3.1 per cent of infants born alive Of these deaths 59 or 20.3 per cent occurred in infants born prematurely 132 or 45.4 per cent occurred in infants born at term Prematurity must therefore be recorded as the largest single factor in infant mortality of this period

The following tabulation gives the exact time of death in premature infants and those born at term

	Premature	Full term	Total
Died on first day	12	38	140
Died on second day	8	10	18
Died under one week	135	98	233
Died during second week	2	34	36

EDWARD L CORNELL

GENITO-URINARY SURGERY

KIDNEY AND URETER

Williams T A The Syndrome of Adrenal Insufficiency *J Am Med Ass* 914 Jan, 203
By Surg Gynec & Obst

Williams on account of the perversion or abnormone of secretions of ductless glands covers the question of suprarenal insufficiency in cases of so called neurasthenia in which definite somatic disturbances are ascertainable where the pelvic adnexa and abdominal viscera are inflamed where there is disordered metabolism with arterial hypertension early cerebrospinal lues of the paresis type and disordered glandular function especially from the thyroid

He differentiates hypo adrenalism from psychasthenia melancholia nosophobia and hypochondriasis yet the line of demarcation is not abruptly drawn in his case histories Cannon is quoted as showing that the adrenal vein contains a greatly increased amount of glandular secretion following fright with the hypothesis that a prolonged hyperadrenalism will superinduce hypo-adrenalism

The pathology in the suprarenal gland is thought to be a destruction of the glandular substance or cortex The medullary changes should not be especially harmful on account of accessory chromaffin body tissue

He divides the cases into (1) improved or curable (2) non improved (3) fatal Eight cases are reported five were cured or improved one was not improved and two ended fatally

The treatment consisted of psychologic therapy with hygienic environment active out-door exercise two to four grains of adrenal substance twice daily

Cases 5 and 6 presented interesting dissimilar results from their treatment The former was worrying because of impotency and a six months marriage contract confronting him After treatment potency returned which was followed by marriage

In Case 6 also a love affair aggravated the condition which treatment and marriage did not improve

In the discussion the claim was made that glandular products procured from animals castrated during their early youth suffered a quality on account of the deterioration of the animals also that hormone is never single but poly or multi glandular Williams considers that not all endocrine disorders are pluriglandular C E Buxton

Freyer P J The Symptoms and Diagnosis of Stone in the Urinary Tract *P J Urol Lond* 94 Oct 4
By Surg Gynec & Obst

Freyer discusses at length the symptoms of calculus in the urinary tract bringing out a few

interesting facts in regard to hemorrhage He makes the following divisions

1 If it comes on gradually it is a sign of stone in the bladder when it is sudden or profuse it is not

2 In bladder-stone the hemorrhage occurs at the end of micturition the earlier portions of the stream being clear

3 Exercise increases and rest diminishes hemorrhage from the bladder

From Freyer's paper the conclusion is drawn that there is no pathogenic symptom of calculus of the bladder and that while the symptom complex is perhaps worthy of study yet the cystoscope and a careful examination of the bladder by means of it is the only reliable method of studying bladder stone

He describes in detail the method of introducing and use of the cannula and how by means of the Bigelow aspirator water is alternately forced into and out of the bladder the stone will thus be drawn up with force against the eye of the cannula and a diagnosis made in this way

If these methods of diagnosis all fail in some cases stone can be found in the trabeculae of the bladder

The question of renal calculus is discussed and the point is emphasized that very small calculi produce severe renal colic while the large ones produce a heavy dull aching pain in the side The point is made that frequently stones in the ureter elude the X ray Freyer says that when the stone is implanted in the lower inch or two of the ureter it may sometimes be felt by the finger introduced into the rectum in the male or into the vagina in the female the fingers of the other hand making counterpressure above the pelvis A C Stokes

Kelly H A and Lewis R M Diagnosis of the Particular Form of Hydronephrosis Due to Movable Kidney *S G Gy & Obst* 914 Nov 66
By Surg Gynec & Obst

Kelly and Lewis report and discuss a case of chronic intermittent hydronephrosis due to movable kidney The case is of particular interest in that it is one typical of a class in which exact diagnosis is possible As both history and physical examination were unsatisfactory and insufficient to establish a diagnosis the right ureter was catheterized and it was soon discovered that the function of the kidney on that side was far below normal only the smallest trace of phenolphthalein previously administered hypodermatically was excreted in one and one half hours Eighty cubic centimeters of sterile boric acid solution were injected into and recovered from the pelvis of the kidney without causing pain.

The following day the right ureter was again catheterized and 10 cubic centimeters of a 5 per cent and 50 ccm of a 1 per cent silver iodide emulsion were slowly run in. A radiogram was then taken after which some solution escaped by the catheter and some was washed out.

The radiogram shows the ureter distended with the silver iodide emulsion from the tip of the catheter up to a point one centimeter below the renal pelvis. The large dilated pelvis lies plainly outlined above. Between the pelvis and injected ureter is an arc in which the silver iodide has not manifestly lodged. This evidently represents the site of the obstruction which is due not to the presence of a stone but to a kinking of the ureter just below the renal pelvis.

A diagnosis of chronic intermittent hydronephrosis was made and the right kidney removed.

At operation the kidney was found to be enlarged to a mere shell. The pelvis was readily exposed and as expected a right angle kink was found in the ureter just where it had its origin. The ureter itself was adherent to the lower surface of the pelvis for a distance of one and one half centimeters. It then bent sharply downward in its normal direction.

The ureteral lumen was opened just below the kidney but none of the contents of the renal pelvis escaped until the dense adhesions doubling the ureter onto the pelvis were dissected free. A gush of watery fluid containing particles of silver iodide then followed and in this way the mechanism of the obstructing valve was clearly demonstrated. The arrangement of the parts was like that of the structures at the internal inguinal ring designed to prevent hernia. Here unfortunately the valve proved itself all too competent and ended by bringing about the destruction of the kidney.

Section of the kidney showed but a rim of cortex. The hydronephrotic sac contained a considerable amount of the injected silver iodide emulsion. This is contrary to the usual experience that in the injection of the pelvis and ureters of actively functioning kidneys all traces of the iodide are generally removed within forty eight hours.

Cunningham J H Acute Unilateral Hematogenous Infection of the Kidney *J Am M A* 9 5 13 3 By Srg Gynec & Obst

The pathological processes originating in the so called acute unilateral hematogenous infections of the kidney are divided into (1) those with abscess formation and (2) diffuse inflammatory processes without breakdown of tissue.

In the first class a single kidney with multiple multiple abscess formations from which malignant exudate results the organ must be sacrificed in order to save the patient's life.

In the second class the type of diffuse acute unilateral inflammation of the kidney can only be clearly defined and must depend upon the course of

is undertaken in this class, nephrectomy is not the only procedure to be employed. Favorable results have been obtained by simple decapsulation by puncture of the infected areas with drainage by splitting the kidney, closing the kidney wound by suture by decapsulating the organ or by decapsulation and drainage of the kidney pelvis, as in the cases of this class which he has reported in the original article.

The clinical picture is discussed in detail together with the report of a number of cases. I S Koltz

Burger L. and Lautman M : Concerning Mixed Tumors of the Kidney *Am J S & G* 914 xxvii 433 By Surg Gynec & Obst

Burger and Lautman give a detailed account of the gross and microscopic pathology of a mixed tumor of the kidney whose structure throws some light on the question of the origin of these growths. Characteristic for mixed tumors of the kidney is the simultaneous occurrence of two or more varieties of derivatives of the mesoderm including smooth and striped muscle, cartilage, fat, elastic fibers, myxomatous and fibrous connective tissue together with the inclusion of certain epithelial elements and fat. Many authors have regarded these neoplasms as derived from rests of the wolffian body but when we remember that many of the tumor elements are not constituents of the wolffian body we are forced to seek elsewhere for a satisfactory elucidation of the problem of origin.

The authors call attention in review of the embryology to the fact that in the fetus certain structures namely the mesodermic somites and the intermediate cell mass bear a close relation to each other. These mesodermic somites consist of numerous cells arranged around a central cavity which soon disappears. The cells of the somites are gradually arranged into three sets: the muscle plate, the sclerotogenous layer and the subepithelial or cutaneous lamella. The cells of the muscle plate layer lose their epithelial like character and give rise to the striped muscle of the body. The sclerotogenous layer is responsible for many of the skeletal tissues including of course the production of cartilage. The cutaneous lamella (mesenchyme) contains cells that undergo histological differentiations and are utilized in the formation of the cutaneous tissues, the connective tissues, smooth muscle and bone. From the mesenchyme originate myxomatous, fibrillar, cartilaginous, osseous types of connective tissue, the lymphoid apparatus, smooth muscle and possibly even vessels and blood. In the intermediate mass develops the wolffian body. Hence in the myotome in the sclerotogenous layer in the mesenchyme and in the intermediate cell mass are found structures that afford the possibility of origin of mixed tumors of the kidney.

In the authors case—a tumor which complicated a hydronephrotic kidney—only adipose tissue, fibrous tissue, cartilage, smooth muscle and

vessels were found a combination which is unique and which still further supports the contention of Walms that the mixed tumors are not derived from the wolffian body alone for in this particular specimen only such tissues are included as could be derived from the mesenchyme the intermediate mass or wolffian body being not at all represented in the make up of the growth. This circumstance speaks in favor of the correctness of the assumption that the mesodermal somites with possibly the intermediate cell mass are responsible for the origin of mixed tumors the theory that rests of the wolffian body are wholly engaged being untenable.

Krotoszyner M. Differential Diagnosis of Nephrolithiasis and Renal Tuberculosis by Roentgenography. *J Am U 41* 914 1 u 2006

By S rg Gy ec & Obst

Krotoszyner discusses the differential diagnosis of nephrolithiasis and renal tuberculosis on the basis of radiography and reports in this connection the following interesting observations:

1. A case of so called total tuberculous putty kidney (Kittiere) in which the plate about 4 cm below the huge and very dense kidney-shadow demonstrated an oblong smaller shadow which through its location and difference in density could be recognized as a ureteral stone.

2. A case of scattered calcified tuberculous foci looking exactly like stone shadows which appeared on the right kidney plate of a man of 41 who was brought to the hospital in deep uræmic coma. The operation and post mortem in this case demonstrated marked tuberculosis of both kidneys.

3. The case of a woman of 44 with a right sided pyuria and intermittent attacks of renal colic in whom cystoscopically an entirely normal bladder was found while apparently typical stone shadows appeared on the plate of the right kidney region which at operation were found to be due to calcified tuberculous foci of the kidney on that side.

Another source of error in the diagnosis may arise from the possibility that a shadow seen on the plate is caused by an object outside the kidney.

The author concludes that in the absence of other characteristic diagnostic data the correct differential diagnosis of renal lithiasis and tuberculosis through radiographic evidence alone is only feasible in total putty kidney while scattered tuberculous calcified foci are as a rule not differentiable from calculus shadows. Pyelography may at times be a valuable aid in the radiographic diagnosis although on account of its dangers to the patient it is not destined to become a routine measure.

the personal observation of the writer have brought him to the conclusion that there is a necessity for more careful study of renal function prior to operation and he suggests the following various methods:

1. The study of the nitrogen elimination and of the freezing point of the urine or the blood.

2. The use of dyes injected intramuscularly or intravenously such as methylene blue indigo carmin or phenolsulphonephthalein.

3. Use of various drugs such as phloridzin or potassium iodide.

4. Experimental polyuria.

These are the chief tests but there are many others and all have their uses and limitations hence Stevens recommends the use of three tests simultaneously viz the urea phloridzin and phenolsulphonephthalein used successively at the same sitting. Experience has shown that the use of one of the tests mentioned will as a rule give very reliable evidence as to the functional ability of the kidneys. Fisher however questions this on theoretical grounds and Ware thinks that the phenolsulphonephthalein test is practically useless.

A great majority of those who have worked with the phenolsulphonephthalein however are of the opinion that its evidence is reliable and valuable and it is easily applied. The technique of this test is simple and the apparatus is inexpensive a good Luer syringe a few test tubes one or two 1,000 ccm cylinders a colorimeter the phenolsulphonephthalein and some 10 per cent sodium hydroxide solution.

The drug is injected preferably intravenously the time of appearance in the urine is noted and the excretion for the first two hours after this time is estimated by the use of the colorimeter. This should be from 65 to 100 per cent of the amount injected in a patient with normal kidneys. In case there is marked diminution in the amount excreted operation should be deferred if possible until a more careful study can be made or some other form of anesthesia should be used not ether. At any rate the surgeon and the patient or his family could know the condition beforehand.

In conclusion King urges that all patients be more carefully examined especially the middle aged or elderly in order to discover hidden renal disease. The blood pressure and the cardiovascular apparatus should be studied. The functional tests can be easily applied and should be used in all questionable cases. The single urinary examination the morning of the operation performed hastily by an overworked intern is practically valueless. Even though these precautions should be useless in four hundred ninety nine cases they would probably save the five hundredth. II A 1002

Federsen V C. Limitations of Functional Test of the Kidneys. *Tr Am Urol Ass* Baltimore 1915 April

By S rg Gy ec & Obst

Federsen emphasizes the general importance especially surgically of modern functional tests of

King, F L. The Necessity of More Careful Study of Renal Function Prior to Operation. *J Urol* 1915 April

By S rg Gy ec & Obst

Five cases of death from post-operative suppression of urine where ether was used coming under

kidney with insistence on not the isolation of one or more tests but the correlation of all recognized methods including polyuria indigo carmin phenol sulphonephthalein phloridzin estimation of urea in the urine and blood and possibly the relation of blood pressure observations to the other tests. All these must be associated with complete urinalysis for physical chemical microscopical and bacteriological data.

Each test considered in turn dismisses the polyuria method as chiefly of value in securing a correlation between the excretion of the water imbibed and the dye administered during the same periods of time. The quantity of dye excreted in a large flow of urine as is sometimes seen in polyuria tests should be computed on the quantity and not the percentage basis, by multiplying the total fluid by the percentage of dye present otherwise misleading observations would result in that the better kidney would seemingly excrete the largest quantity of fluid but the smallest percentage of dye.

In the phenolsulphonephthalein test the author's method of subdivision is described by which each specimen is divided into equal parts of which half is sent to the laboratory for analysis and half employed for determining the percentage of dye excreted such readings manifestly are to be multiplied by two in correction of the subdivision. Where the percentage of dye is seen to be so low that accurate reading by the ordinary scale is impossible the author's method of subdivision is used. By this method the specimen is raised not to 1,000 but to a prime factor of 1,000, so as to concentrate the color preferable to a reading between 30 and 100. Such reading of the scale is therefore to be divided by the number of times the said prime factor is contained into 1,000 in order to bring the reading up to the basis of the dilution to 1,000 which is standard. The indigo carmin test is judged as of chief value in corroboration of the phenolsulphonephthalein test in cases in which the latter is not strictly available and in patients in which the time of excretion of the dye from each side is a matter of importance but the value of the orange color given to acid urine by the phenolsulphonephthalein is pointed out as having great merit in the majority of instances. Acidulation of alkaline urine with dilute hydrochloric acid followed by alkalinization with the hydrate of soda or potash will avoid the peculiar dirty brick red color in alkaline urine due to the presence of loose ammonium compounds and will render it as easy to obtain correct readings in alkaline urine as in acid urine.

The phloridzin test is to be regarded as the least reliable because often the better kidney is much the less permeable to this substance under the influence of the diseased organ and the technique is therefore not a method of choice. The author believes that the estimation of urea in the urine and blood should be made not by the determination of the freezing points which requires expensive and cumbersome apparatus but by the application of

urease a glucoside of recent discovery and great promise as to accuracy. The chief point to remember is that the amount of urea excreted by each organ in a given period of time is much more important than the percentage exactly as in the case of dyes especially in the presence of a polyuria test correlated with the other tests which on the mere percentage basis might give misleading results.

Blood pressure is of value in many cases in that it rises with the ingestion of the water and injection of the dye and falls in a regular rate with the excretion of both if at least one kidney is competent. All the foregoing tests lose a large if not the greatest part of their value unless all the specimens secured are submitted to standard laboratory examination physically chemically microscopically and bacteriologically and these in turn must be checked up by the examination of twenty-four hour specimens always before and preferably also after the other tests under the influence of rest in bed free catharsis and antinephritic diet in order to eliminate extraneous and uncertain factors. Pedersen believes that this combined method of thorough investigation of the kidney function is the only one which will endure the test of time and experience.

Brasch W F and Thomas G J. The Practical Value of Chemical Tests of Renal Function in Surgical Conditions of the Urinary Tract. *J Am Med Ass* 1915 120 104.

By Surg Gynec & Obst

The authors review their use of chemical tests in surgical conditions of the kidney in order to form an estimate of the practical value of such tests (1) for the purpose of determining the efficiency of the remaining kidney (2) for the estimation of renal capacity in cases of renal obstruction and (3) as an aid in the diagnosis of doubtful lesions of the kidney. Their observations and conclusions are based upon their experience with phenolsulphonephthalein as they consider that it has more virtues than other test of like character and at the same time is representative of all the fallacies of chemical test of renal function.

Of 485 cases at the Mayo Clinic requiring nephrectomy 9 died as the result of the operation insufficiency being the cause of death in but one case. The authors' review of necropsy data indicates that deaths from renal surgery more often result from faulty technique or infection than from insufficiency of the remaining kidney. They call attention to the fact that when one kidney is badly damaged the functional capacity of the other may be reflexly low. The fundamental weakness of all functional tests which are used as prognostic aids is that while they may show the functional capacity at the time of examination they cannot foretell the capacity after operation and reliance is better placed upon careful cystoscopic examination and clinical data to determine the efficiency of the remaining kidney.

The authors have studied 68 cases of urinary

obstruction in which repeated tests would seem to indicate that an arbitrary operative danger line of 20 per cent output as mentioned by many writers cannot be laid down. They cite 11 operated patients with an output of less than that amount with only one death that being due to cardiac insufficiency. On the other hand they report 2 cases having an output of 75 per cent whose deaths were evidently due to kidney insufficiency. They conclude that the clinical evidence of renal insufficiency after the usual course of pre-operative treatment is of greater importance than the functional test and should determine the advisability of prostatectomy. In proof of this a series of 97 prostatectomies without a death is cited.

They think the greatest value of the functional test is its aid in the diagnosis of renal and ureteral lesions as renal stone, ureteral stone, hydronephrosis, renal tumors, renal tuberculosis, renal infection, bilateral cystic kidney, essential hematuria and atrophic kidney.

Usually the output is low in cases of renal stone but they cite cases with a good amount of good tissue which have shown a low output. The same cases having a practically normal output after the removal of the stone.

They have found the test of value in estimating the comparative degree of renal destruction in bilateral nephrolithiasis but in one case of bilateral stone the secretion was the same from both sides. Nephrectomy was found necessary because of the marked destruction of one kidney. In cases of bilateral stone showing a low combined output in two hours the advisability of operation is doubtful.

In ureteral stone equal function does not always exclude the possibility of stone in the ureter. Diminution of secretion is of particular value in only a small percentage of cases.

In hydronephrosis of considerable size they find a marked diminution but in the small hydronephrotics in whom the functional test might be of diagnostic value there is but little difference in secretion.

In cases of renal tumor the classical symptoms of blood pain and tumor usually suffice for diagnosis in the absence of bleeding. Marked diminution from one side suggests intrarenal lesion. In 20 cases examined diminution was found in but 6. Infected neoplasms show a greater diminution but in these cases cystoscopic evidence should be the basis for diagnosis.

In 4 cases of essential hematuria no diminution of function was found. Diminution on the offending side would indicate a surgical condition.

The authors think the functional test not infrequently applicable to the following conditions: (1) renal tuberculosis with hemorrhage and without other clinical or cystoscopic evidence; (2) renal neoplasms which cause no recognizable tumor; (3) renal stone with negative roentgen ray findings; (4) chronic pyelonephritis but any of these conditions may be present without marked diminution of function.

Diagnosis could be made from clinical evidence in every case of atrophic kidney. Except where diminution is very marked the chemical test is not of diagnostic value in cases of renal infection. Cases of this kind with marked signs of insufficiency have been known to show no diminution of function. The test is of great importance in cases of early renal tuberculosis with marked comparative diminution. The authors have observed cases of bilateral tuberculosis with high output in two hours but have noted several cases of unilateral infection with a combined output of only 25 per cent. They do not find it of value in estimating which of two tuberculous kidneys is the more infected. In their experience if cystoscopy fail to determine from the urine secreted which kidney is largely destroyed operation is contra indicated. The authors cite a few cases of perinephritic abscess in two of which the functional test isolated the diseased kidney in one there was no diminution in a kidney badly diseased. In polycystic kidney diminution occurs only when there is considerable destruction of tissue. In 7 cases only 2 showed an output of less than 40 per cent. They found the test of value in comparative estimation of the two kidneys.

The authors conclude by saying: We should like to emphasize that it is not our purpose to be little Ceraghy and Rowntree in their thoroughly scientific efforts to establish a chemical estimate of renal function. The phenolsulphonephthalein test because of its ease of application and rapidity of secretion remains as probably the best functional test at our command. Nor is it our purpose to detract from the value of a careful examination of the character of ureteral secretion in surgical conditions of the upper urinary tract. It is our contention however that the fundamental surgical principles and clinical data should determine whether or not an operation is indicated and that renal functional tests are of practical value largely as an aid to differential diagnosis and only to a limited degree as a prognostic aid.

Thayer W S and Snowden R R. A Comparison of the Results of the Phenolsulphonephthalein Test of Renal Function with the Anatomical Changes Observed in the Kidneys at Necropsy. *Am J U S* 9 4 1 11 681.

By Surg. Gynec. & Obst.

As a result of a very careful analysis of a considerable number of cases in which it was possible to compare the results of the phenolsulphonephthalein functional kidney test with the actual morbid changes present in the kidneys the authors conclude that the test is of considerable diagnostic and prognostic value. In not a single instance did they meet with a case with a good phthalein elimination in the presence of severe chronic changes of nephritis.

The 7 cases are grouped under the heads of advanced chronic nephritis, chronic nephritis of moderate extent, severe acute nephritis, amyloid

in 3 hypernephroma and 1 chronic passive congestion and in all these cases it was found that there was a marked decrease in the phthalate output which in most cases was progressive and proportionate to the severity of the lesions. Of these 131 subjects 134 seemed to give the most marked and uniform reduction in excretion yet even in these absolute values could not be plotted on the results of the test as it needed to be found that 3 subjects before death excreted in this test an output of 55 per cent while another 73 and 62 lay before death excreted with an immeasurable test.

In cases of chronic nephritis of mild extent when leukaemia was imminent there was a much smaller reduction in the output and the test seemed to be of less prognostic value. The three cases in which test with methyl violet was closest proximity to the time of death namely 10, 12 and 12 days gave percentages of 0, 10 and 42 respectively. In chronic passive congestion the prognostic significance appeared to be less than in true nephritis though there was usually some reduction in the output.

Huggins, R R Decapsulation of th Kidney
1 1 11 1 19 5 2

If again reports several cases of severe eruptive
consequence upon acute infection in which per
formed the localization operation of the blood
these cases all have very remarkable symptoms
manifest improvement in which the history is
of long duration of the infection they re much
better following operation also. It has been
the operation may be indicated in the following
conditions:

1 T neph us f flowing a ut ; sent g by
mercury of arholie aul

Nephritis following infection especially due to infective diseases which then mark the lesion or uraemia. It uses haematuria and edema. A medical man uses it has been the regally. I wish out relief especially in the adult and children. In acute haematuria in chronic nephritis when urate is low in the urine and albuminuria.

4 I culmpe when in provent la n e
f flow l h r y

5 In m aile kile y amut i with album
1 t J S F F T DE

Fukutaki W II and Friedman I. *Psychophysiology* 1977; 10: 101-105.

the Diagnosis of Traumatic Injury of the Kidney 1581

The authors give a very interesting discussion

of the value of pyelography in cases of traumatic injury of the kidney. This report describes the case

the region of the kidney pelvis. An operation

In the first level the psychographic shadow showed that the collagen remained within the calyces of the kidney. In a rat it was not in a child the patient recovered.

The authors claim that the pain of injection of the collagen in the ruptured kidney is quite different from the usual injection when the kidney pelvis is intact. In the ruptured kidney is a dull pressure pain referred to the lumbar region while in the intact it is a colicky pain. They are of the opinion that the type of the psychographic shadow is of great value in making a prognosis as to whether or not a kidney is ruptured.

A C Stokes

Geipi M J A Case Exemplifying the Value of
Psychography N Ori M & S J 914 Is u 535

(1) report case of hyponephrosis which

or a nonperiodic stack of δ in \mathbb{N} which could be realized by \mathcal{P} at certain intervals and then

again in type red entirely. The enlargement is
very great at times and reached five inches below

The costal arch (x) telescopic examination and
with the use of the ureters were negative at

though functional test with 32 P labelled phthalate showed little secretion and reduced amount

from the right kidney it being only 5 per cent in the first two hours while the left excreted 11 per

X-ray plates after injection of the pelvis with

by In nephrotic kid caused by kinking

was a mild, there being no symptoms of tumor

Th. Effect of Collateral as Fm

employed in Psychology / 1st M 1 9 5
122 123 R 12 C Dec 2. Oct

Prompted by the report of ill effect upon the
kidneys, and especially the following the injection of

roll got into the rental pool. He admitted under
1001 a series of circumstances and he carefully

measuring the initial injected and the pressure employed. Her first illustration with micro-

photographs of pathologic lesions produced in the kidneys themselves and the lesions in remote

He found that in those periods in which the

quantity of cull gold is not needed in the
capacity of the plant and a high percentage of

pressure was used there was partially no damage in the kidney and no damage to the epithelium.

When the pressure and quantity were established, the collagen was found frequently either in a

kidney or both in one case it was found in the blood vessel of the kidney. It therefore concluded that all renal cell carcinoma of the kidney if no more

this limit is exceeded or the fluid is injected with too much force then deposits occur in the kidney parenchyma there are infarcts or hemorrhages into the spleen and liver or various lung changes are caused such as hemorrhage, oedema or pneumonia
J S EISENSTADT

Keyes E L Jr and Mohan H The Damage Done by Pyelography *Am J U S* 19 5 cols 30
By Surg Gynec & Obst

As the result of experimental injection of collargol into the renal pelvis of dogs the authors came to the following conclusions

Momentary gentle distention of the normal pelvis of the kidney causes no more damage than a brief congestion but if the distention persists for a few minutes the injected fluid is absorbed into the blood vessels and lymph spaces about the kidney pelvis. The authors regard the appearance of the collargol within the glomeruli and tubules as a secretory phenomenon

Of far greater importance however than the primary retention at the time of injection is the possibility of a secondary infiltration due to retention of collargol in the renal pelvis as a result of ureteral obstruction. This secondary retention is the cause of most of the deaths that have been reported from pyelography. Alarming symptoms following injection into the renal pelvis should be relieved by immediate drainage of the kidney or by nephrectomy. The presence of collargol in the kidney parenchyma as shown by radiograph or by operation should not be a cause of apprehension though it shows that the injection has been made with too much force. The collargol may enter the general circulation and be distributed to the other kidney and elsewhere in some instances at least and yet no great harm result

H L SANFORD

Buerger L Unusually Large Ureteral Calculi
N Y J 9 4
By Surg Gynec & Obst

The author reports two of his own cases of enormous calculi of the ureter. In the first case the calculus measured 10 cm in length and filled a large portion of the middle and lower third of the left ureter. Its presence had produced a marked hydronephrosis. Removal of the kidney and the ureter was followed by prompt recovery.

In the second case the calculus was situated near the lower end of the right ureter and measured two in length by one and one eighth inches in width. It also had produced a hydro-ureter and hydronephrosis. The patient refused nephrectomy and removal of the calculus was followed by recovery.

The author concludes from the study of these cases that (1) enormous stones can be formed in the ureter as a result of deposition of salts about arrested ureteral calculi acting as a nucleus (2) such large calculi may give history of ureteral

colic most of the symptoms being referable to the results of ureteral dilatation and hydronephrosis (3) catheterization of such ureters is possible (4) even in cases where infection of the hydronephrosis or hydro-ureter has taken place primary union may be obtained without any leakage following removal of the calculus from the ureter
H L SANFORD

BLADDER, URETHRA, AND PENIS

Allen C W The Use of Clamps in Resection of the Bladder Report of a Case *N O J* 11 6
S J 914 1v1 523 By Surg Gynec & Obst

The treatment of malignant tumors of the bladder is in the great majority of cases a difficult and unsatisfactory undertaking. Simple growths particularly of the papillomatous type promise to yield good results when treated by the high frequency current but further time is needed to definitely settle to what extent this treatment can be depended upon. In malignant growths this treatment is not indicated and operative means must be depended upon for its relief. If seen early by the surgeon these cases of malignancy offer a fair prospect of ultimate cure depending upon the type of growth its location and extent.

Occasionally the development of some symptoms such as profuse or continuous hemorrhage compels an emergency operation such as was necessary in the case treated by the author. Undoubtedly the best method of procedure would have been the resection of that portion of the bladder surrounding the growth but in view of the patient's weakened condition and extreme exsanguination it was out of the question to perform this by the usual method. With rapid and feeble pulse and shallow respirations he was threatening to collapse on the table consequently a more rapid yet effective method of dealing with the situation was demanded. Allen was accordingly enabled to put into effect an idea which he had had in mind for some time. Two stout clamps having curves at right angles to the shank were selected. These were tested to determine their dependability. The tissues on each side of the base were then caught by Ochsner clamps and pulled up into the field for some distance. This ridge of tissue was then grasped in opposite directions and below the bite of the Ochsner clamp by the curved clamps. Their application as well as the unfolding of the bladder wall was guided by one hand beneath the bladder. When both clamps were securely in position and well clasped with their tips in contact the mass of tissue within their grasp and to which the growth was attached was cut away with the actual cautery. A Pezzer catheter was then passed through the urethra into the bladder the incision into the bladder closed except at the fundus where an opening was left through which protruded the handle of the clamps. The abdominal incision was closed up to the bladder which was sutured to the posterior sheath of the rectum. The patient was quiet weak following this ordeal but rallied well.

left long The testicle enclosed in the tunica vaginalis was then quite free except for its connection with the spermatic cord. An incision about an inch long was then made over the front of the left side of the scrotum. The free end of the ligature transfixing the gubernaculum were then seized with Spencer Wells forceps which were then introduced through the incision in the external oblique pushed along the inguinal canal through the external ring into the right side of the scrotum. The ends of the forceps were then made to impinge against the scrotal septum. A small incision was made on the forceps through the wound in the left side of the scrotum the forceps carrying the ligature was pushed through to the left side and the ends of the ligature secured. The forceps were with drawn and by pulling in the ligature the right testicle was drawn along the track made by the forceps along the inguinal canal through the scrotal septum to the left side of the scrotum. Both wounds were then closed.

The patient was readmitted two months later and the left testicle was then transplanted to the right side of the scrotum by a similar operation.

No sutures were necessary for the fixation of the testicle in its new position the contraction of the opening in the septum preventing its return and exercising a gentle continuous traction which is absent in the ordinary method of orchidopexy.

The advantages of transplantation to the opposite side of the scrotum are as follows:

1 The testicle is transplanted to the well developed side of the scrotum where there is much better accommodation for it than on the ill developed side.

2 It is usually possible to effect the transplantation without dividing the vessels of the cord.

3 Sutures to fix the testicle in its new position are unnecessary and the organ itself is not damaged during the operation.

4 When the testicle has been drawn through the septum in the scrotum the small opening contracts hence the weight of the scrotum acting through the septum exerts a continuous slight force tending to keep the testicle in its new position.

5 The operation is carried out without dividing the external abdominal ring and with the least possible damage to normal tissues.

EDWARD L. COLE

Hinman F. The Operative Treatment of Tumors of the Testicle. Report of Thirty Cases Treated by Orchidectomy. *J. Am. M. A.* 94: 131, 1909. *By Surg. Gynec. & Ob.*

Within the last ten years reports have appeared of 42 attempts to remove the testicle and its primary lumbar lymphatics according to the clear and definite anatomical findings of all of the modern and radical principles in the surgical treatment of malignancy. In justification on the results of this procedure have never been analyzed in comparison with the mortality results following simple castration. The

purpose of Hinman's study is to determine from a review of the literature and an analysis of the cases of the Johns Hopkins Hospital the true value of castration and to compare this with the results that have followed the use of the radical operation the particular object being to determine whether the radical operation is ever justified and if so under what conditions.

Merely removal of the testicle had been regarded as virtually hopeless until Chevassu in 1906 reported 10 per cent cures in 100 cases following castration. Few other statistics of satisfactory or reliable data have appeared since Chevassu's classical analysis although some more recent authors have become unduly optimistic of the result of orchidectomy. A careful analysis by Hinman of 32 cases treated by castration at the Johns Hopkins Hospital gives a cure of only 15 per cent. Half of 18 cases of which the pathological material was personally examined were embryonal carcinomata, half teratomata, sarcoma was not found—which corresponds to the recent (1911) pathologic findings of the study of Ewing.

This high mortality has stimulated surgeons to seek more radical treatment. Hinman describes with illustrative charts the lymphatic drainage system of each testicle and the steps of procedure in its radical removal. The reported cases are analyzed in detail with respect to duration, clinical presence of metastases, metastases which were absent clinically but found at operation, number of cases inoperable because of the extent of metastases which were clinically absent, the probable cures and the ultimate mortality. His summary and conclusions are as follows:

1 Orchidectomy will cure from 15 to 20 per cent of teratoma testes. Obviously a cure is possible only when the testicle is removed before the onset of glandular or other metastases.

2 A cure cannot be assured until nine years after operation although the danger of recurrence after four years is very small—only three cases reported—and progressively diminishes.

3 Cancer of the testicle metastasizes in practically every case first and primarily to a limited zone of lumbar lymph nodes which lie on the aorta for the left testicle and on the vena cava for the right between the bifurcation of the aorta and the renal pedicle. Communication between these two groups and to deeper and more distant glands occurs only secondarily.

4 Involvement of these primary lymph nodes may occur early or late and the preoperative duration of the tumor in the testicle its rapidity of growth or its size give no definite clinical indication of the onset or extent of such metastases but the probabilities increase the longer the duration and the more rapid the growth.

5 Pathologic differentiation of tumors of the testes into embryonal carcinomata and mixed cell types is more or less arbitrary as both are teratomatous in origin but the former appears to be

treatment is as in the first and second stages. For the sake of testing function the 24 hour amount of urine should be measured. The specific gravity determined the nitrogen and chlorides at intervals of a day and the indigo-carmin test applied. Cryoscopy of the blood is also of importance and cases in which the other functional tests and the freezing point test give unfavorable results should be excluded from operation. The size of the prostate has no significance in the indications for operation.

General anesthesia is to be preferred as a general rule but if there are special contra indications Braun's local anesthesia should be used. The transvesical operation through a median long incision is the best procedure but in especially difficult cases and in fat men a suprasymphysal transverse incision with incision of the recti muscles is made. The prostate is bored through and enucleated digitally after the mucous membrane is incised. This is rendered easier by counterpressure through the rectum. After the operation is completed the field of operation is irrigated with 2 liters of salt solution and the edges of the bladder wound are drawn together on the right and left by a strong silk suture passing through all the layers; the suture however is not tied. The bladder wound is sutured with catgut sutures except for an opening large enough to insert a drain as large as the thumb with a right angled glass tube attached. An iodoform gauze strip is introduced into the prevesical space also two strips in the bladder to support the tube. The fascia and skin are sutured. A compression dressing is applied, large tampons being placed on the perineum and above the wound.

The after treatment consists in suction of the urine by von Schlagentweit's method. The dressing is first changed on the fourth or fifth day and at the same time the bladder strips are shortened. The prevesical strip is left until the seventh day. After a week the drain is replaced by a smaller one or is fully removed and a permanent catheter applied and then the first bladder irrigation is given. In infection of the suprapubic wound or any other complication such as epididymitis, urethritis, etc. where a permanent catheter is not feasible Paschke recommends the Irving capsule. The only conservative operations worthy of consideration are the formation of a suprapubic fistula and in the cases not adapted to operation the use of a permanent catheter.

M. ICH

MISCELLANEOUS

King, E. F. Myiasis of the Urinary Passages. *J Am Urol Ass* 9 4 13 283
By Surg Gynec & Obst

The author reports a very interesting rare case of a pterous larva commonly known as the latrine fly in the urine of a farmer. The author quotes Rene Chérel as the first of all reported cases of myiasis of the urinary passages; only twenty such cases have been reported.

The patient a man aged 32 while at work in his garden was seized with an intense desire to urinate hurried to a shed and urinated in a glass kept for the purpose. He felt something pass with the urine and found the larva in the glass. Two hours later the larva was received at the office in a perfectly fresh condition for examination. He had voided similar objects with the urine twice before but had not had them examined. L. O. Howard, entomologist of the U. S. Department of Agriculture identified the specimen.

THEO DROZDOWITZ

Churchman, J. W. Examination of the Urine for Tubercle Bacilli. *Am J M Sc* 1914 cxi 11 722
By Surg Gynec & Obst

The author urges the importance of using every possible device to increase the chance of finding the tubercle bacillus when it is present. In one of his cases in which an ulcer existed in the vault of the bladder well away from the trigone the bladder was distended with water to the point of discomfort. The washings were centrifuged and several clumps of tubercle bacilli were found; they doubtless had been washed off the surface. Repeated examination had been made in the usual way with negative findings.

This technique is especially recommended when an ulcer exists in the vault of the bladder at a point where it is seldom reached by the urine. Both ureters were catheterized and the urine injected into guinea pigs with negative results. A diagnosis of primary bladder tuberculosis without demonstrable kidney lesion was made in this case.

In suspected miliary tuberculosis the urine should be examined for tubercle bacilli for the value of urinary examination in these cases is far greater than that of sputum examination.

HENRY J. VAN DEN BERG

Martin, W. F. Value of Hydrotherapy in Urology. *J Am Urol Ass* 9 5 14
By Surg Gynec & Obst

Martin calls attention to the various hydrotherapeutic measures and their indications and value in many urologic conditions. He discusses the physiologic effect of cold and heat and their mechanical and reflex effects and enumerates the benefit derived in cases of acute urethritis by immersing the organ alternately in hot and cold water several times a day. The advantage is shown of a not too prolonged sitz bath in calculous colic while in chronic conditions. Martin advises following the warm with a cold sitz bath. The cold sitz bath is particularly recommended as a palliative treatment of prostatic hypertrophy with congestion, malignant growths with hemorrhages, atonic dilated bladders and sexual debility. For the use of this procedure the tolerance for cold must be gradually built up.

The various types of balneotherapy, their chief value in promoting skin elimination and generally raising the patient's resistance before operation are also discussed.

J. S. ISENSTADT

SURGERY OF THE EYE AND EAR

EYE

Jackson E. Operations on the Extraocular Muscles. *Ophth Rec* 19 4 xx 11 54
By Surg Gyn c & Obst

Jackson says that a man can easily operate himself out of practice and he brings out the neglected factors to success in ocular operations such as the importance of the secondary abductors or adductors in lateral squint the importance of preserving the dominance of the primary abductor or adductor near the center of the field of fixation and lastly that vertical squint requires an operation changing the relative extent of the various functions performed by the same muscle.

The time used in tenotomy could be better spent learning the indications and contra indications for such an operation because luck and brilliant surgical technique does not save one from unsatisfactory results. Tenotomy especially had its rise and fall until Landolt and his school say that it should not be done in any case.

The more important physiologic facts although considered in discussions have been neglected in bringing out certain anatomic conditions hence great importance is attached to first accurately correcting ametropia and observing the result e.g. the influence of paresis on one or more muscles the distribution of the effect of the operation between opposing muscles preliminary fixation of the squinting eye and the measurement and development of the fusion sense.

Because it is usually assumed that each muscle has its particular function and has no connection with the other muscles the cooperation of the various muscles is emphasized. An operation on any one of the muscles if it alters the effect produced by the contraction of that muscle alters the general muscular balance. In each particular movement if the eye one muscle has a leading or primary function and the other muscles subsidiary or secondary function. The relation between these primary and secondary functions varies in wide limits but in the case of convergent squint it is of great importance.

The marked effect of the superior and inferior recti in both secondary abduction and adduction is shown. The point most strongly brought out is that in adduction the effect of the secondary abductors is not felt until the limit of adduction is reached and then they become effective assistants so that in convergent squint fully two thirds of the force required to keep the eye turned is exerted through the superior and inferior recti. In contrast to this however when the eye is turned out far enough the superior and inferior recti will

help it turn more hence the internal rectus is with out its ordinary secondary assistants to oppose this.

The reason why tenotomy of the internal in high convergent squint produced little effect is that the tendons really holding it—superior and inferior recti—were untouched hence if the nasal portions of these were cut the desired effect was secured with no risk of recurrence or divergence. In the case of high divergent squint advancement changes the direction of the eye so that the secondary adductors can assist. The real danger in tenotomy of the internal rectus lies mostly in transferring the predominant control from the primary adductors to the secondary. Hence the axiom that the primary adductor and abductor tend to equilibrium with the eye at the center of its field of movement the secondary adductor and abductor tend to draw the eye away from this center.

The advantage of advancement is not in the increased strength of the muscle advanced but in the preponderance given to its influence over the influence of the muscles that would assist it as their secondary function.

In paralysis of the superior oblique deviation of the superior rectus and transplanting it farther back and to the temporal side thereby neutralizing the extorsion and tendency to turn down is one of the several ways of correcting this condition.

In right hyperphoria of 10 to 15 degrees, especially after dissociation for 10 minutes partial or complete tenotomy of the superior rectus will give great relief. It has much the same effect as the above.

Complete oculomotor paralysis is dealt with in the following manner. The superior oblique is detached at its insertion of the internal rectus the external is split and one half is attached to the upper and the remainder to the lower temporal portions of the eyeball.

Synd. W. L. J.

Cockrell B. A. Corneal Ulcer Its Complications and Sequelae. *A. J. O.* 9 5 xii 58
By Surg Gyn c & Obst.

The cornea being the most exposed portion of the eyeball is the most frequent seat of injury and infection of the whole globe and because of its non-vascular formation it has a special adaptability for ulcers. An ulcer once started must be completely obliterated and all aseptic precautions applied to stop further infection.

The diagnosis as to the kind of an ulcer is made from the history of the case the location of a foreign body the condition of the other portions of the eye by systemic conditions by the character and formation of the ulcer and by the aid of the microscope.

Phlyctenular ulcers being those caused by the various micro-organisms are treated by scraping and curetting. All soft tissues should be removed and the adjacent tissues scraped toward the ulcer to empty the interlamellar spaces. A careful watch should be kept and the scraping repeated on the slightest evidence of further infection.

If the ulcer is tubercular or specific the treatment of the primary condition naturally follows.

Fully 95 per cent of the corneal ulcers are due to the pneumococcus. Antipneumococcus serum will promptly cure the majority of such cases but local treatment should be used in conjunction with all other treatments.

For small ulcers use nitric acid either pure or diluted with pure water half and half. Apply by dipping a wooden toothpick or match in the acid hold in the air until the surface of the wood no longer glistens then press it against the ulcer until it whitens.

Iodine is especially adaptable to all ulcers of the indolent type. It lessens rather than increases scar tissue. For the latter it seems to possess a peculiar affinity and to exert a remarkable influence. The judicious use of iodine cannot be too warmly advocated. In the majority of cases one application is sufficient but in some instances two and even three applications are necessary. Use the tincture of iodine in all cases.

Cocaine to complete anesthesia insert an eye speculum scrape the ulcer with a spud or similar instrument dry the ulcer thoroughly and apply tincture of iodine on a few fibers of cotton around a probe applicator or toothpick. Be careful to protect the healthy part.

Another treatment is a watery solution of iodine gr 1 (0.065 gm.) sodium iodide gr 3 (0.2 gm.) and water one ounce (30.0 gm.). Use three drops of this solution three or four times a day. It is not very painful and the congestion of the conjunctiva is only temporary. This may be used for several weeks in indolent cases.

The use of the actual cautery is equally as efficient as scraping though more alarming to the patient. This may be done by a galvanocautery tip steel knitting needle or steel probe heated to a white heat in an alcohol flame.

Dendritic ulcers — those of the nerve endings — are best treated by scraping then applying silver nitrate or formaldehyde 60.

In all ulcers due to keratitis dilatation of the pupil by atropine is necessary to prevent posterior synechia and iris complications.

Caustics should be neutralized by weak acid or water and should be dipped in a boric acid solution.

The acids should be neutralized with soap suds soda or lime water.

Yellow oxid of mercury an important adjunct in the treatment of all cases as it preserves aseptically and is very soothing. A plain diet outdoor exercise and plenty of fresh air should be insisted upon. General systemic treatment is very important.

The irritating propensities of cocaine should insure its very sparing use. It has no medicinal value in the eye and should never be used except as an anæsthetic.

Fellows C G: New Methods in Dealing with Cataracts. *Clinical* Chicago 1915 22 11 1.
By S. R. Gynec & Obst.

In dealing with immature cataracts there is the possibility of an early operation without the old method of semidarkness for years. Fellows advocates preliminary capsulotomy on the morning of the day the extraction is to be done in the afternoon.

This method has been developed considerably since its accidental discovery by Homer E. Smith. The preliminary capsulotomy adds much to the success of the final operation and the adoption of free lavage of the anterior chamber so heartily praised by Colonel Elliot is another addition to the technique to be recommended.

Fisher W. A. Loss of Vitreous in the Intracapsular Cataract Operation and Its Prevention. *American Ophthalmic* 9 5 21 8.
By Surg. Gynec & Obst.

Fisher favors the intracapsular operation in cataract extractions. Its sole disadvantage is loss of vitreous occasioned by pressure upon the eyeball by the lids and by the operator. The first of these he practically eliminates by the use of his retractor and double hook and the latter is lessened by his new instrument which is a modification of the Smith's spoon: i. e. a needle at the other end. He shows how the use of the needle prevents loss of vitreous when in its removal the lens sticks in the corneal opening. The point of the needle is stuck into the lens and the lens lifted past the obstruction whereas the Smith's hook alone necessitates increased pressure and probable consequent rupture of the capsule or loss of vitreous. The author notes that Smith has not accepted his suggestion of the use of the needle. C. A. MACHRY.

Knapp A. Report of One Hundred Successive Extractions of Cataract in the Capsule After Subluxation with the Capsule Forceps. *American Ophthalmic* 9 5 11 1. B. S. R. Gynec & Obst.

Knapp employs the Koster speculum and Kait capsule forceps with halocaine anesthesia and one drop of atropine solution. No assistant is necessary unless complications arise.

A large corneal section with a conjunctival flap is first made. After an iridectomy the capsule forceps is introduced to a point below the center of the pupil. The branches are then allowed to separate broadly and a distinct knuckle of capsule is grasped. The grasp should not be too tight lest the capsule be torn but sufficiently firm to exert traction on the periphery of the lens capsule. The closed branches of the forceps are gently moved from side to side, up and down or rotated and the capsule can be seen to follow in the various directions. When the disloca-

sequently the author advises that in all cases of arthritic inflammation, with an associated saddle lesion it would be well to consider the latter as a likely primary causative factor.

The other location most noted as being loci for metastases originating from an infective thrombophlebitis are the spleen, lungs, kidneys, heart, and brain.

OTR. M. R. 11

Jones, F. L.: The Relation of the Rhinopharynx to the Middle Ear and Nasal Cavity. *J. Am. M. A.* 1913 11 215. *Br. Surg. J.* 1913 2 204.

The author contends that every case of acute middle ear inflammation must spring from a pathological rhinopharynx, however normal or symptomless it may seem or may have been previously. Consequently the most effective measures must be directed toward treating the nose and removing the cause of the ear trouble.

In all cases, whether acute subacute or chronic and regardless of the specific cause, the author forcibly swabs the rhinopharynx with a mixture of phenol tincture of iodine and glycerine to which camphor and menthol have been added of sufficient strength to set up a violent reaction with sore throat lasting from part of a day to several days.

The author uses two results are: 1. Isten grain each of camphor and menthol rubbed to a liquid in a dram of compound tincture of iodine 2. dram of alcohol and 1/2 ounce of glycerine to make 1 ounce. This is called the camphor menthol compound.

One part phenol tincture of iodine saturated with potassium iodide and two parts glycerine. This is known as the I & A C compound and is used as follows:

Method of application: Use a large applicator to which 1/2 fluid ounce of the I & A C compound is added and squeeze against the bottle neck to remove excess, then dip in the compound menthol compound and rub against the middle ear only, sufficient to prevent dripping. Introduce the camphor menthol compound and rub the middle ear.

In the painful stage of a middle ear inflammation or in the acute catarrhal stage, how pain the nostrils are best sprayed with the I & A C compound cream. This is done as follows: The application is made by the use of a tube.

OTR. M. R. 11

Bledsoe, R. W.: Treatment of the Middle Ear Through the Eustachian Tube. *Am. J. Surg.* 1913 11 215. *Br. Surg. J.* 1913 2 204.

In the treatment of the middle ear through the eustachian tube, the author considers the middle ear as a closed space, the pressure of which is maintained by the eustachian tube. The author considers the middle ear as a closed space, the pressure of which is maintained by the eustachian tube. The author considers the middle ear as a closed space, the pressure of which is maintained by the eustachian tube.

The author prefers catheterization as the most satisfactory and scientific method of inflating the eustachian tube, employing a pure soft silver catheter passed with great gentleness and delicacy and regulating the quantity and force of the air introduced through the catheter by use of the auscultation tube.

He uses this method of treatment in cases of moderate or acute pain in the ear of a few days' duration where the drum is slightly injected and retracted in tubal and middle ear inflammation of mild degree and in inflammations of a severe grade he uses catheterization under strict asepsis in conjunction with paracentesis.

Alexander, G. J.: Nasal Obstruction as the Cause of Disease of the Middle Ear. *J. Otol. Rhinol. Laryngol.* 1913 36. *Br. Surg. J.* 1913 2 204.

The author mentions four types of such cases: 1. Those coming primarily from treatment of ear conditions who have a momentary nasal obstruction which may be the preliminary factor in the etiology of the ear condition.

2. Those coming for treatment of a nasal obstruction who at the same time have or have had an affection of the ear.

3. Those coming for treatment of both conditions. 4. Those coming with an ear condition that contains in its nature an element of treatment a nasal obstruction, the existing cause may be found.

The following are the causes of nasal obstruction mentioned: 1. The size of the nasal cavity. 2. The position of the nasal cavity. 3. The position of the nasal cavity. 4. The position of the nasal cavity. 5. The position of the nasal cavity. 6. The position of the nasal cavity. 7. The position of the nasal cavity. 8. The position of the nasal cavity. 9. The position of the nasal cavity. 10. The position of the nasal cavity.

The causes of middle ear disease resulting from the above are: 1. Middle ear disease. 2. Middle ear disease. 3. Middle ear disease. 4. Middle ear disease. 5. Middle ear disease. 6. Middle ear disease. 7. Middle ear disease. 8. Middle ear disease. 9. Middle ear disease. 10. Middle ear disease.

Stimson, E. W.: Packing and Removal of the Middle Ear. *J. Am. M. A.* 1913 11 215. *Br. Surg. J.* 1913 2 204.

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SURGERY OF THE NOSE, THROAT, AND MOUTH

NOSE

Hays H The Surgery of the Posterior Tip of the Inferior Turbinate the Relation of the Posterior Tip to Catarrhal Deafness and Tinnitus.

Am J S 2 9 5 11 20

By Srg Cyner & Obst

Hays states that the importance of the posterior tip of the inferior turbinate in the causation of deafness is not often appreciated. He describes the following operation:

The turbinate is first well cocaineized and then the posterior tip is infiltrated with about 30 mm of one quarter of one per cent cocaine solution with equal parts of adrenalin. This balloons the tip sufficiently to make it easy to operate upon. An angular pair of scissors is introduced closed beneath the turbinate. By rotating the blades upward and inward the turbinate is fractured at right angles. An incision is now made in the turbinate at the posterior third deep enough to introduce the tip of a wire snare. The wire is passed over the enlarged tip and the shank of the snare pressed firmly into the incision. By closing the wire the posterior tip is firmly grasped and snared off. A small strip of bismuth subnitrate gauze is then placed against the cut surface.

The author has noticed considerable improvement in cases of deafness after the posterior tip was removed in this way.

Freer O T The Inferior Turbinate Its Flap Re-section to Reduce It When Obstructive.

Arch St M Soc 9 5 1 7

By Surg Cyner & Obst

The operation is done under cocaine anesthesia with the patient in a semirecumbent position. The light employed is the Kratzen headlamp. An assistant standing behind the patient's head holds the nostrils open with two of the Freer's improved shortened nasal retractors. The operator usually needs a third retractor held in his left hand to pull open the nostril downward in order to permit him to see better along the nasal floor. With the knife a horizontal incision is made to the bone from the hindmost end of the turbinate forward along its lower border to its very front terminating there in an upward sweep by a vertical cut which lies across the foremost part of the turbinate.

From the horizontal part of the incision the knife is used to elevate upward as much of the flap as possible. The operator then continues its elevation from in front from the vertical part of the incision by means of the naspatry the sharp elevators or knives from the author's septum set. When the entire flap is loosened it may be pushed upward

out of the way into the middle meatus. Now the chisel with its bevel looking toward the nasal floor is applied to the foremost attachment of the lower turbinate bone and made to follow the line of merging of the lower vertical part of the turbinate with its upper horizontal part. The loosened piece of bone is grasped with forceps and any adhering shreds of membrane are cut by the sharp elevator. The flap is smoothed down and if the posterior end is hypertrophied it is cut away by the knife.

The nose is packed with layer packing of lint impregnated with dry subnitrate of bismuth powder. After three or four days the strips become movable and loose of their own accord when they are extracted. The external nostril should however be kept closed to the air current for about ten days by a small wad of cotton. When the patient is permitted to use his nostril he should be instructed to anoint it with an ointment of linolin and oil of vaseline equal parts with boracic acid forty grains to the ounce for a period of two to three weeks.

Orro M Rort

Hanger F M An Intranasal Operation with a Guide for the Cure of Dacryocystitis. Laryngoscope 9 5 xxv 23

By Surg Cyner & Obst

The author recommends his operation for the cure of dacryocystitis only in those cases where probing the nasal duct with Theobald's probe No 1 or 13 has failed to obtain results.

After thorough cocaineization of the nasal duct a Theobald's No 3 probe is introduced and left in situ as a guide during operation. After cocaineization of the inferior turbinate and nasal wall the inferior turbinate is severed with Struycken's nasal forceps and about one third of the bone cut away when the lower end of the probe is seen in the lower meatus. Withdrawing the probe slowly the opening is rapidly enlarged with a gouge, chisel, or punch forceps until the nasal wall is removed above the stricture.

It is best to pack the nose with a strip of gauze for twenty-four hours and irrigate the lachrymal sac for a few days.

ELLEN J PATTERSON

Glogau O A Case of Dacryocystorhinostomy. Laryngoscope 9 5 xxv 28

By Srg Cyner & Obst

The author describes his modification of Halle's operation for dacryocystitis which is performed in a few minutes and saves the patient from the annoying probing during after treatment.

The technique is as follows: After cocaineization of the nasal wall the sac is washed out through the

slit canaliculus cocaineized and a lachrymal probe introduced at the anterior attachment of the middle turbinal bone together with its lining of mucous membrane is chiseled away until a hole 3 mm in diameter is formed and the chisel strikes the probe. A thin blunt pointed probe with an eyelet at one end through which No. 2 white silk is threaded is introduced and drawn through leaving the silk drain. The ends of the silk are tied at the canaliculus no external dressing being used. Medicament is applied by means of the silk which remains in place several weeks. **ELLEN J. PATTERSON**

Kahn H. and Gordon L. E. The Use of Pituitary Extract as a Coagulant in the Surgery of the Nose and Throat. *J Am Med Ass* 915 Jan 301. By Surg. Gynec. & Obst.

Pituitary extract (Parke Davis & Co.) administered hypodermatically in the dose of 12 minims to children and 15 minims to adults not less than fifteen minutes before the intended anæsthetic materially reduces the coagulation time of the blood and reduces the hæmorrhage following operations upon the nose and throat. These observations were made upon children and the effect upon the blood pressure was variable. **ELLEN J. PATTERSON**

Hill G. W. Skiagram of Frontal Region Showing Symmetrical Fronto-Ethmoidal Cells Extending Above Roof of Orbit. *Proc Roy Soc Med* 194 vol Laryngol 512. By Surg. Gynec. & Obst.

In reference to this skiagram showing accessory fronto-ethmoidal cells extending far outwards between the frontal sinus floor and roof of the orbit it had been assumed hitherto that the occasional presence of these cells first described by Sir St. Clair Thomson under the name orbito-ethmoidal could only be ascertained by the Killian technique and this assumption had been used as an argument for the inadequacy of the Ogston type of operation. The cells however could be seen by radiography quite clearly and could at least be drained by Good's type of operation. **OTTO M. ROTT**

Hill G. W. Skiagrams of Frontal Sinuses Operated on by Good's Method. *Proc Roy Soc Med* 194 Laugol Sect 2. By Surg. Gynec. & Obst.

Hill recently performed Good's type of prenasal operation for enlarging the frontal sinus on five frontal sinuses using Good's peculiar bone rasps. He admitted that the technique appeared to be both easy and safe but thought it too early to speak of the permanent result. The immediate relief however was striking. **OTTO M. ROTT**

Haseltine B. Obscure Sinus Disease in Relation to General Health. *J Ophth Otol & Laugol* 915 15. By Surg. Gynec. & Obst.

By using the term obscure sinus infections the author desires to exclude those acute infections

easily recognized and to emphasize the fact that the low grade chronic often unrecognized sinus disease is the one most insidious in its effect upon general bodily health. Such a patient may have no marked symptoms calling attention to the nose or sinuses perhaps with no history other than what he calls slight catarrh and possibly even with no objective symptoms discovered by the usual cursory rhinological examination.

The following general conditions are mentioned and discussed as being caused by this obscure infection.

- 1 Chronic anæmia or chronic toxæmia
- 2 Hypertrophy and hypothyroidism
- 3 Chronic rheumatism or recurring rheumatoid arthritis
- 4 Otosclerosis
- 5 Bronchial asthma

The following local diagnostic measures are mentioned for recognizing these obscure conditions of the sinuses.

- 1 Thorough rhinological inspection or repeated inspections at various times including shrinking of intranasal surfaces postural tests use of the nasopharyngoscope etc.
- 2 Argylol tamponade by the method of Dowling repeated if necessary
- 3 Transillumination and roentgenography
- 4 Bacteriological study including cultures from the nasal and sinus secretions. **OTTO M. ROTT**

Brose L. D. Nose Throat Ear Orbital and Intracranial Complications in Accessory Sinus Diseases. *Laugol* 952 35. By Surg. Gynec. & Obst.

Complications in accessory sinus diseases may be intranasal as obstructed nasal breathing of the throat as pharyngitis adenoid or tonsillar hyperplasia laryngitis tracheobronchitis or spasmodic asthma orbital by continuity of structure or in a mechanical way by pressure on the optic nerve intracranial as meningitis or brain abscess and in the ear secondary to pharyngitis.

ELLEN J. PATTERSON

McKenzie D. Brain Abscess Secondary to Frontal Sinus Suppuration Drainage; Recovery. *Proc Roy Soc Med* 94 Laugol Sect 2. By Surg. Gynec. & Obst.

The patient a young man aged 27 was taken to the hospital with a fistula in the right eyebrow leading into the frontal sinus of that side.

The history was as follows. Six weeks before the patient who had for some time been troubled with a purulent discharge from the nose, suddenly developed an abscess in the right upper orbital region with high fever and some delirium. After the abscess had been opened and freely drained these constitutional symptoms rapidly disappeared and the patient recovered sufficiently to go to his business. He then died an altogether normal life. As the fistula did not close however he was taken to the hospital

certain of the cases the disease has in its course affected not only the antrum but parts of the nasal cavity
Otto M. Rott

THROAT

Harrison W. G. Tonsillectomy During Acute Endocarditis. *S. Wkly J.* 915 11 59
By Surg. Gynec. & Obst.

After reviewing some of the literature on the sequelae of acute tonsillitis Harrison reports six cases in which tonsillectomy was performed during an attack of acute endocarditis the operation thus performed being of distinct value in relieving the cardiac trouble.

The following conclusions are appended:

1. Rheumatism or acute rheumatic fever with its frequent complications of endocarditis, pericarditis, chorea, etc., is often the result of acute cryptal tonsillitis.

2. The milder attacks of tonsillitis with lower temperature and transient sore throat are more apt to be followed by arthritis than are the severe attacks of tonsillitis.

3. It is often wiser to perform tonsillectomy during an acute attack of endocarditis and remove the source of infection than delay with the hope of operating after the acute attack has subsided.

4. The tonsil crypts can sometimes be cleansed by local applications and by syringing with antiseptic solutions but in spite of the most assiduous care it will sometimes be impossible to find every focus.

5. Cultures should be made from the tonsil in all cases of joint or heart involvement and properly preserved from the cultures vaccines can be made and the patient properly treated with them in cases where the fever and other signs of infection do not disappear within a reasonable time after operation.
Otto M. Rott

Vanderhoof D. A. Abscess Following Tonsillectomy Under Local Anesthesia. *La. J.* 915 11 59
By Surg. Gynec. & Obst.

The author reports the case of a healthy man aged 23 upon whom he performed tonsillectomy under local anesthesia using 30 drops of cocaine of approximately 0.0005 of 100 of a 1% solution of 10 cc. and a 2 percent solution of 10 cc. in.

On the evening of the following day the left jaw became red and on the next day had developed swelling with a redness of the face. The swelling under the left inferior maxilla the left eye was swollen and the blood oozed from the leucocytosis in upon exploration of the tonsillar fossa found deep infection of the submaxillary gland.

Two days later the patient discharged pus from the throat from an opening in the lower part of the operative field. On the following day the tonsillar fossa had remained normal following operation. Three weeks after operation the patient had entirely recovered.
F. L. J. PATTERSON

Fipchick G. J. F. Hemostatic Guillotine. *P. oc. Roy Soc Med.* 914 11 Laryngol. Sci. 26
By Surg. Gynec. & Obst.

The instrument was designed for the complete enucleation of tonsils which are removed from their beds with their capsules without loss of blood.

The method used is approximately that of Sluder but in addition to the one cutting blade there is a crushing blade which enters between the anterior faucial pillar and the tonsil and effectually crushes all vessels between the capsule of the tonsil and its bed. When the crushing blade has been pushed home it remains locked in the position by the Hagedorn catch at the base of the handle of the instrument. A light pair of fixation forceps is then applied to the protruding tonsil and the cutting blade which enters between the crushing blade and the tonsil is pushed home. The tonsil is lifted out on the fixation forceps. The crushing blade being still applied to the vessel which have been cut through may be left on for a few moments and then gradually released by pressing down the catch with the little finger.
Otto M. Rott

Thomson St. C. Intrinsic Epithelioma of the Larynx Suitable for Laryngofissure. *P. oc. R. v. Soc. Med.* 1914 11 23
By Surg. Gynec. & Obst.

The patient aged 69 complained of absolutely nothing except hoarseness which had been coming on for six months. The whole of the left vocal cord was replaced by a red knobby ulcerating infiltration the cords moved well the rest of the larynx was quite normal there were no enlarged glands. The Wassermann reaction was negative. There were no indications of tubercle. He was a non-smoker.

The case was shown to illustrate the difficulty of diagnosing certain cases of epithelioma of the vocal cord. The infiltration was not suitable for removing a portion for microscopic examination. It was proposed to treat the case by laryngofissure for which it seemed eminently suited.
Otto M. Rott

Shrimbaugh G. F. and Lewis D. D. Laryngeal Diarrhea. *Phl. J.* 11 23
By Surg. Gynec. & Obst.

Three types of laryngeal diarrhea are found: (1) the extralaryngeal, (2) the combined in which an tracheal and laryngeal sac commingle with each other, and (3) the intralaryngeal.

The following conclusions are given after a study of the literature of these rare diseases:

The sudden formation of the diarrhea and the stage at which symptoms first develop would indicate that they are probably congenital, and that they are analogous to the laryngeal cases of ulceration and hemorrhage.

The treatment is either antiseptic or stant in the position of the patient and the use of laryngeal

intralaryngeal or combined type. The extralaryngeal sac can be removed easily as in most cases the pedicle is small and there is little or no intralaryngeal prolongation.

3. The intralaryngeal and combined types are best treated by excision. In cases in which the intralaryngeal sac cannot be enucleated after incision of the thyrohyoid membrane the thyroid cartilage may be split longitudinally in front of the superior horn. By this method the enucleation of the internal sac can be made practically extralaryngeally.

Intralaryngeal methods consisting of splitting of the sac and partial removal of the wall are unsatisfactory for the posterior extension of the sac is removed with difficulty if at all. Air and pus collecting within this extension causes a recurrence of symptoms.

Orto U. Rott

Ingal, E. F.: Symptoms and Diagnosis of Laryngeal Tuberculosis. *Laryngoscope* 10: 5, 22, 13. By Surg. Gynec. & Obst.

For the detection of the earliest manifestations of tuberculosis the author thinks a careful analysis of the history should be made including hereditary tendency together with a careful examination of the objective signs of departure from health.

He considers the early symptoms of tuberculous laryngitis as those of an ordinary cold continuing for several weeks attended by a hacking cough with little or no expectoration, some weakness of voice, hoarseness, loss of weight and strength, some rapidity of pulse and a slight afternoon elevation of temperature. Other early signs of tuberculosis are anemia of the mucous membrane of the nasal cavities, especially of the palate, and a thinness or atrophy of the laryngeal walls with later a pale dense swelling of the epiglottis and pyriform swelling of one or both aryepiglottic folds.

The later signs are dysphagia due to ulceration of the larynx with the symptoms of pulmonary tuberculosis superadded to the local symptoms.

Litt. J. Parke, M.D.

MOUTH

Loeb, V.: Acute Parenchymatous Glossitis. *J. Am. Med. Assn.* 9: 41, 2020. By Surg. Gynec. & Obst.

The author briefly reviews the subject which he deems rather rare. The several types are known as (1) acute parenchymatous deep phlegmonous and interstitial.

It is noticed most frequently during the winter months and attacks males more frequently than females occurring between the ages of 30 and 40.

The etiological factors are exposure to cold and dampness with a lowered resistance. Although at times it does follow the infectious disease, especially scarlet fever. No specific germ has been isolated though streptococci and staphylococci have been found.

Predisposing causes are injuries such as those of carious teeth, faulty dental work, tooth picks, Gerhard adds corrosive substances, hot liquor and stings of insects.

The affection begins with pain which comes suddenly and increases in severity affecting particular areas.

The organ swells rapidly filling the oral cavity often protruding the tongue. The temperature rises, salivary secretion is increased and the patient is in danger of suffocation. Deglutition and respiration are difficult and cervical lymphatics are palpable.

The differential diagnosis lies between it and acute swelling due to salivary calculus and other acute swellings in the floor of the mouth.

The pathology is that of an acute violent inflammation with intense injection of the lymphatic vessels chiefly in the musculature. The prognosis should be guarded on account of possible complication. Bennett gives a mortality of 3 per cent. Recovery may be by resolution or suppuration. Result and gangrene may develop. The treatment should be immediate and surgical, deep longitudinal incisions being made along the dorsum on either side of the median line. If a deep abscess at the base of the tongue develops which cannot be reached through the tongue it must be attacked from without. Gangrene should be treated by the cautery.

In all cases antiseptic mouth washes should be used freely together with cold applications and morphia to control pain.

The author reports a case showing a photograph of a protruding tongue conical in shape. No pus was found after 10 aspirations which by the profuse bleeding induced reduced the congestion.

Continuous cold applications to the tongue, morphine nasal and rectal feedings within 48 hours so reduced the size of the tongue that the patient could talk and even swallow with difficulty.

In acute nephritis was present which also responded to proper treatment.

H. A. Forster

Rosenow, E. C.: Mouth Infection as a Source of Systemic Disease. *J. Am. Med. Assn.* 1914, 1: 20, 6. By Surg. Gynec. & Obst.

The author has found that the organisms in some of the more chronic infectious lesions are quite different from the organisms found in the focus of infection at the same time. This however does not minimize the importance of the focus of infection in any way as the organisms in the tissues may have undergone a change which would modify the action of an autogenous accumulation from the focus as it would not contain proper antigens. Observation has led him to believe that it is in the focus of infection that the change in virulence and the different affinities for various structures are acquired. In other words the focus of infection is to be looked upon not only as the place of entrance of the bacteria but also as the place where the organisms acquire the peculiar property necessary to infect.

While the mouth is probably the most common source of infection one should look further. In connection with acute infections (rheumatism) the author cites a case in which repeated thorough examinations had been made but no focus found until it was located by isolating a streptococcus from the intestinal tract which when injected into animals produced rheumatism. The patient was immunized for a long time by a vaccine made from that organism. Later he had trouble with his teeth and his dentist found an alveolar abscess and pyorrhea. From this mouth which showed no signs of inflammation the author made cultures which produced rheumatism in an animal.

Another case in which the focus of infection was overlooked was that of a boy who had an acute attack of rheumatism with endo and pericarditis which developed ten days after the boy had suffered a crushing injury to his thumb. A culture from a necrotic area on the thumb revealed a streptococcus like that of rheumatism which produced rheumatism in an animal. To find the causative focus of infection not only the stomatologist but the general practitioner and surgeon should be consulted.

II A. PORTS

Mayo C. H. Mouth Infection as a Source of Systemic Disease. *J Am Med Ass* 9:14 11:25
By Surg Gynec & Obst

Since all animal life depends on some other form of cell life vegetable or animal it seems but the part of all life to carry on this process of germinative development and maturity. It is only the resistance of healthy cells that prevents the inroads of the myriads of ever present bacteria and animal parasites which are striving to get a foothold that they may in turn carry on their life work. Disease then is an inflammatory process from infection and the efforts at repair. It may also be chronic from the failure of cell life through lack of defense from defective nutrition and advancing age. The diseases of childhood are largely preventable.

Infections which produce the greatest number of diseases enter the system by way of the alimentary and respiratory tracts and the great importance of the well known diseases of the nasal passages with their sinusitis, laryngitis, tonsillitis, pharyngitis including the tonsils and the diseases of the gums and teeth are well known generally appreciated. Smithies has shown contrary to the current belief that the acid gastric juice destroys bacteria that the gastric juice from a 6 patient with gastric complantism found bacteria in 9 percent and from a study of his findings it appears that the common forms of pathogens are resistant to the proliferation retarded in gastric juice but that bacilli (often of the colon group) as well as lipothrix bacteria thrive in the stomach.

Bacteremia occurs in infectious diseases and according to their number and virulence the blood responds in slight or extreme degrees to the symptom general or local or both of the disease.

The author refers to the work of Rosenow not only in showing bacterial mutation but in showing that the gastric mucosa is attacked from behind through the blood stream by bacteria which live in the blood and have a selective action for these particular areas causing ulceration.

Septic bile which in the majority of cases is caused by infection carried to the liver through the portal circulation is changed in that it fails to activate the pancreatic and duodenal secretion thus making various phases of indigestion with qualitative rather than quantitative food trouble.

Acid bathed or acid-secreting surfaces are very subject to cancerous change while alkaline bathed surfaces are much less liable to be involved.

The infected mouth shows a tendency to acid reaction and it is through this acid change that we have an additional danger in cell degeneration of a malignant type from irritation.

The author advises a more effective school in spection by competent men.

II A. PORTS

Billings F. Mouth Infection as a Source of Systemic Disease. *J Am Med Ass* 9:14 11:25
By Surg Gynec & Obst

The author confines his remarks to alveolar infection as related to systemic disease, advising the use of radiographic films as by no other method can the exact condition of the alveoli and roots of teeth be determined. General systemic conditions may cause mouth infection and alveolar disease but whether primary or secondary alveolar infection may be the dominant factor in the production of malignant endocarditis (streptococcus viridans), chronic arthritis and myositis. The streptococcus pneumococcus group apparently comprise the important pathogenic bacteria related to systemic disease and such systemic disease due to focal infection is probably hematogenous resulting in embolism of small and terminal arteries causing ischemic hemorrhage and endoarterial proliferation resulting in interstitial overgrowth cartilaginous osseous vegetation and other morbid changes dependent on the tissue infected.

The author cites the experiments of Arthusen who ligated the blood supply to joints and produced conditions simulating rheumatic deformations except the action of the bacterial emboli in causing the also mentioned joint changes.

To manage and in suggest these patients require teamwork by specialists.

After the focus or foci have been removed by various means including if necessary the use of autogenous vaccines the patient must have the natural defenses against viral infection strengthened by rest, both mental and physical, good air, wholesome food, optimism, surroundings, restorative medicines and other drugs.

Immunity be relieved and the first passive exercise followed by active gradual exercise in order to restore the circulation in the affected parts and the health restored. II A. PORTS

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M 9 J Am M Ass 9 4 lvi 202 [561]

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SOME OBSERVATIONS ON BONE TRANSPLANTATION

By DR. VAN LEWIS M.D. F.A.C.S. Chicago

CONCLUSIONS based upon experimental work differ as to the fate and function of transplanted bone. Barth no longer holds as tenable his earlier view that a transplanted segment of bone acts merely as a scaffolding for developing osteoblasts in other words that it is simply osteoconductive. He accepts the view of Arthausen, Phemister and others that the compact bone of the graft is absorbed and that it is replaced by bone formed by the periosteum and endosteum of the graft.

Undoubtedly as Macewen states the vegetative capacity of a bone cell is as great as that of an epithelial cell and each graft proliferates from its center the whole eventually fusing into one mass. In proportion to the size of the bone graft the smaller the graft the greater is the proliferation. If small grafts of compact bone could be used the bone would live but in most cases we are compelled by the nature of the case to use large transplants in order to maintain fixation and preserve form. Compact bone dies in large grafts because its physical properties do not permit of rapid enough absorption of serum to maintain the life of the bone until the vascular circulation is reestablished. The ideal graft should contain enough compact bone to maintain the required form and give a certain amount of fixation when needed but not so much that cellular death followed by substitution occurs to any extent. The ideal condition is rarely if ever secured

in bone transplantation. As it has been demonstrated that substitution of the compact bone takes place in greater part from the graft proper the most active bone forming elements periosteum and endosteum should be included in the graft. The anteromedial surface of the tibia is to be preferred. I believe to the crest of the tibia as the source of the graft for in such a graft cut through to the marrow there is endosteum as well as periosteum and enough compact bone to maintain the form of the graft and secure some fixation but not as much as is usually taken in grafts cut from the crest of the tibia.

While the blood forming elements of the marrow rapidly degenerate the bone-forming elements come in intimate contact with the serum and are most favorably situated for the preservation of life and the assumption of early proliferative changes. Lexer reports some unpleasant experiences in cases in which marrow was included in the transplant. In some of these cases marked inflammatory symptoms associated with a mild fever developed about the transplanted segment. These transplants usually however healed in position in spite of this inflammatory change. He believed the reaction to be due to the absorption of the product of decomposition of the marrow and in his later transplantation the marrow was removed from the graft with a sharp spoon and the resulting dead spaces were filled with bone plug. The grafts in these cases were taken from am-

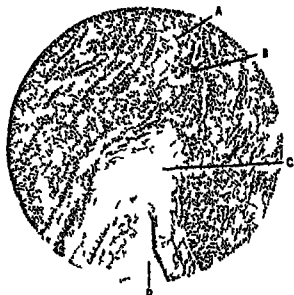


Fig. 5 (box) Case Path N 344 Micro-
 scopical drawing Leitz oc 4 obj 3 tissue
 cells B hamorrhage, C h in degeneration
 D lymph space
 Fig 6 (below) Case 5 Path N 354 Micro-
 scopical drawing of secretory portion showing much fat
 Leitz oc 4 obj 3

Fig. 5 (box) Case 4 Path N 3444 Micro-
 scopical drawing showing loose connective tissue
 cells and blood filled vessels Leitz oc 4 obj 6
 Fig 7 (below) Case 6 Path N 3608 Show
 nuclei close together but no hemorrhage by degeneration
 Leitz oc 4 obj 3

taken with the view of reconstructing the radius. The radial side of the forearm was opened widely the supinator being separated from the flexor group of muscles and the deep branch of the radial nerve located. A transplant was then taken from the anteromedial surface of the tibia and this divided into two fragments. The larger was fixed to the upper end of the lower radial fragment and the small fragment was contacted with the upper end of the transplant the idea being to determine whether this fragment would remain viable if not contacted with living bone. The brachialis anticus was sutured over the upper end of this small fragment an attempt being made to form an orbicular ligament for it. When these grafts were placed and fixed the wound was closed without drainage the muscles being carefully approximated over the transplanted bone.

Three days after the operation the temperature reached 101° F. Infection occurred and six days later the wound was opened the temperature dropping to normal after the pus was evacuated. A sinus formed at the lower end of the lower transplant from which pus continued to be discharged. X-rays taken from time to time indicated that involucrum and sequestrum formation were going on in the lower transplant.

On October 30, 1913, the patient was anesthetized and an incision made in the line of the old scar down to the transplanted bone. The white exposed bone was removed and a drain inserted into the space from which the sequestered bone had been removed. X-ray examinations made from time to time indicate the involucrum formed from these transplanted segments of bone has increased in size and there is every evidence to show that new bone has continued to be formed. The incisions and sinus have healed.

These clinical findings correspond with those already observed in experimental work and seem to me to demonstrate most conclusively that the transplant remains viable and reacts to infection like normal bone and that even in the presence of severe infection when death of the entire transplant might be expected it is able to take part in involucrum and sequestrum formation.

The insertion of bone transplants into infected areas has not been attempted often. The two following cases illustrate the uses of a bone graft to act as a mechanical support to prevent a radial deviation of the hand. The transplant was inserted with the idea that it might act as a mechanical support and that if it had to be subsequently removed it had served the purpose of preventing a deformity which would have been difficult to

prevent by other means. These cases are reported because they indicate the value of immediate insertion of bone grafts in infected areas. They may act as a mechanical support to prevent deformity even if it is necessary to remove them later. In many instances they will remain viable and hasten convalescence.

CASE 2. Mr. T. S., age 25, was admitted to the Presbyterian Hospital July 23, 1913. While supervising the erection of a water tank in Oklahoma the supporting framework gave way and the tank fell. The patient jumped from a height of about fifty feet and sustained a fracture of both bones of the left forearm. The fracture was plated at a local hospital and an infection developed. About nine weeks after the accident the patient entered the hospital. The plate used in fixing the ulna was exposed being on the level of the skin. Several sinuses on the radial side of the forearm led down to a plate which had been used to fix the radius. An X-ray examination revealed a sequestrum of the radius extending well above the plate upon that side.

An operation was performed July 25, 1913. The plate lying upon the ulnar side was easily removed together with several small pieces of bone. Several small necrotic fragments were removed with a sharp spoon. An incision was then made on the radial side of the forearm in the line of the old scar and the plate was removed from the radius. The sequestrum in the radius was also removed. There was little or no evidence of bone formation about the sequestrum. So much of the radius had been removed that subsequent radial deviation of the hand with contracture was feared and there seemed to be so little osteogenic tissue left that a transplant was taken from the tibia and inserted into the defect to act as a mechanical support for even if it were later necessary to remove this graft it would have served a useful purpose. The transplant was fixed to the fragments of the radius by small ivory pegs.

The wound was closed without drain and healing occurred in about ten days. Later two small sinuses formed, one over the lower fragment and one at the lower end of the upper fragment. One of the small ivory pegs was discharged from the former. Several small spicules of bone were discharged from these sinuses. Later the wound was opened and several small cortical sequestra were removed. The defect in the transplant was then filled in with an iodolium bone plug.

The X-ray would seem to indicate that the proliferative change in a transplant placed in an infected area are much greater than those occurring in a transplant placed in a clean field. Undoubtedly some of the shadows about the transplant are from fragments

cavities even when contacted with living bone will not survive in the majority of cases and besides such a graft is often unnecessary for the osteogenetic power of the thinned cortical bone in the central giant cell sarcoma and fibrous osteitis is great enough to form bone capable of weight bearing. The main consideration in lesions of this character is to close the cavities which give rise to sinus formation and the continuance of a discharge.

The two following cases illustrate the use of bone grafts in cavities resulting from curettage of central giant-cell sarcomas. In both cases the cortical bone was very thin but had enough osteogenetic power to repair. The bone grafts did not survive in either case.

CASE 4. G. K. a girl age 17 was admitted to the Presbyterian Hospital September 15, 1913. The girl was well nourished and apparently perfectly healthy. One year ago she had an infection upon the anterior surface of the right knee which was very painful. After the infection subsided the pain continued. This pain was in the upper part of the right tibia and has been a dull ache rather than a distinct pain. The upper part of the leg gradually became larger and during the past few weeks the pain has become more intense. There is decided tenderness over the expanded upper portion of the leg. There has been no interference with the function of the knee joint or effusion into it.

The X-ray findings are typical of central giant cell sarcoma. The cortical bone is of eggshell thinness. The shadow is more or less globular above and does not correspond to the fusiform shadow of fibrous osteitis. The upper epiphyseal cartilage has been invaded at one point but the articular cartilage has been spared. There are no evidences of metastatic growths.

Operation performed September 16, 1913. A longitudinal incision was made over the anteromedial surface of the upper end of the tibia and the thin cortical bone was chiseled away. Two spurting arteries were seen in the walls of the cavity. These were closed with Horsley's wax. The cavity was then carbolicized and the carbolic acid was neutralized with alcohol and a little remaining in the cavity was ignited with a cautery. The cavity was then packed tightly with gauze while the graft was prepared.

The incision was prolonged down to the tibia and a graft measuring about six and one-half inches was taken from the anteromedial surface of the tibia and placed in the cavity. The upper end of this graft was contacted with the articular surface while the lower was placed in a groove in the tibia and fixed with a drilled head. The wound was closed with subcutaneous suture and silk. The stitches were removed on the eighth day at which

time there was a slight discharge of serum which soon ceased. X-ray pictures taken from time to time indicated that the bone was gradually undergoing absorption the graft being distinctly smaller and eroded. In July a small bleb which later opened developed and a sinus formed from which serum was discharged. As the sinus persisted it was thought best to remove the graft. The patient was operated upon September 9, about one year after the first operation. The cavity was opened and the white dead graft was removed. The wall of the cavity consisted of thick sclerotic bone. There were no evidences of recurrence of the tumor. Considerable granulation tissue was found in the cavity which was curetted out. The cavity was carbolicized and dried with heat. A Moscovitz-Moorhoff bone plug was inserted and the skin closed. A small sinus formed from which at times some of the plug is discharged. The function of the knee joint is perfect and the general health of the patient remains good.

CASE 5. W. K. male age 40 was admitted to the Presbyterian Hospital January 10, 1913. He gave a history of having noticed pain about the right knee five years before. On February 13, 1908 the patient fell and was taken to the Cook County Hospital where a diagnosis of traumatic arthritis was made. An X-ray examination made somewhat later revealed a nodule about the size of a half dollar on the medial condyle of the femur. He walked on crutches until July 3, 1908 when he again slipped and was taken to the County Hospital where a cast was applied. The cast was worn for six weeks. An operation was advised at this time. An exploratory operation at which tissue was removed for examination revealed a central giant cell sarcoma. High amputation was advised and refused.

The general examination of this patient is negative. The right knee is flexed at an angle of about 135°. The patient walks with a decided limp holding the knee fixed. The lower part of the right femur is expanded and when attempts are made at moving the knee there is decided limitation of motion. The knee can be flexed but not extended to any extent. X-ray examination reveals a shadow which occupies both condyles of the femur. The internal condyle is more extensively involved than the external. The bone is of eggshell thinness. There has been no extension of the growth through the opening made at the time tissue was removed.

Patient was operated upon January 20, 1913. No constriction was applied. An incision about four inches long was made over the internal condyle of the femur and a piece of the thin expanded bone removed. The exposed mass pulsated and when attempts were made to curette it out the hemorrhage was severe. Not knowing whether I could control the hemorrhage if further curettage were attempted and not having permission to amputate, case I could not be controlled the artery was pricked with iodiform gauze.

On February 4, 1913 the patient was again anesthetized and the central giant cell growth was curetted away a constrictor having been applied. When the constrictor was removed some spurting arteries were seen in the thinned cortical bone and these were plugged with Horsley's wax. The cavity was carbolyzed alcohol was applied and some which remained was ignited with a cautery. As there was still some oozing, the cavity was picked lightly with gauze.

On February 10, 1913 the packing was removed and bone removed from the anteromedial surface of the tibia was placed in the cavity. The skin was closed over the cavity with silk-worm-gut. An attempt was made to straighten the knee at this time. While attempting this the thinned cortical bone was fractured and the lower end of the upper fragment was forced into the cavity. Infection of the edges of the wound where the packing had come in contact occurred and a sinus formed.

July 20, 1913 the opening in the medial condyle was enlarged. Some detached pieces of the tumor were removed and also the dead bone grafts. The cavity was then filled with a Moseley Moorhoff bone plug and closed.

X-ray pictures taken from time to time indicated that bone repair was going on, that the cavity had been greatly reduced in size and that its walls were formed of thick sclerotic bone.

On January 2, 1915 another attempt was made to close this cavity in the femur. The sinus was enlarged and a cavity the size of a hen's egg was found. This was curetted out granulation tissue and a small amount of tumor tissue being found. The latter was found in the medial condyle near the line of the joint. The cavity was treated in the usual way with carbolic acid alcohol and heat. A Moorhoff plug was inserted. When the stitches were removed some of the plug was discharged but the wound appeared healthy. The lower end of the femur has been reduced one half in size. Extension of the leg is still somewhat limited. The cavity is smaller and apparently bone repair is proceeding normally in the thinned cortical bone.

These two cases are reported because they seem to me to indicate a procedure which should be followed in the treatment of central giant cell sarcomas of bone. These are especially unfavorable for bone transplantation. In the first place there is enough osteogenic power in the thinned cortical bone both in central giant cell sarcoma and bone cysts to form bone of sufficient thickness and firmness for weight bearing and in the second place a cavity is most unfavorable for bone grafting and in the majority of if not in all cases the graft will be lost. The clot which will form prevents serum coming

in contact with the graft and later vascularization of the main part of the graft will be retarded or prevented. This is indicated in the first case in which conditions were provided which usually favor the life of a graft but where death of the same undoubtedly occurred as the result of hematoma formation. In the second case the conditions were not ideal for bone grafting as packing of the cavity had to be resorted to for some days to control the rather active hemorrhage.

In the treatment of cavities following curettage of central giant-cell sarcoma or fibrous osteitis I believe that the bone plug is much superior to the bone graft placed within the cavity for the reasons stated above.

BOY GRAPTING IN THE CORRECTION OF DEFORMITIES RESULTING FROM POTT'S FRACTURE

A procedure which is of distinct value and may be regarded as a form of direct bone transplantation and may be used to advantage in the correction of deformities associated with Pott's fracture is illustrated by the two following cases.

CASE 6. E. G. N. age 31 was admitted to the Presbyterian Hospital June 8, 1914. He had sustained a Pott's fracture on the left side one year before. At that time when he was brought to the hospital the swelling about the ankle was so great that reduction was made with difficulty. An open operation was not advised and it is doubtful if any better reduction could have been obtained. When the patient commenced to walk there was some eversion of the foot which was swollen and painful. The motions at the ankle were restricted and a flat foot with some eversion was developing. The internal malleolus was very prominent and tender. An X-ray examination revealed that the internal malleolus was considerably displaced and apparently hypertrophied. The upper end of the lower fragment of the fibula was displaced outward.

As the eversion of the foot caused so much interference with function and pain was increasing an operation was undertaken with the view of overcorrecting the deformity and of reducing at the same time the size of malleolus.

Operation performed June 10, 1914. An incision was made over the internal malleolus which was divided at the line of fracture. The malleolus was dissected out of the scar in which it was imbedded wrapped in gauze and placed on the instrument tray. Considerable callus and connective tissue were removed from the joint near the internal malleolus. An attempt was then made to correct

the eversion of the foot but this was impossible because of the union between the misplaced fibular fragments. The fibula was then resected at the line of fracture and the foot could be overcorrected. Fearing non union because of the defect bone was taken from the tibia on the same side and transplanted into the defect. The malleolus was then trimmed down to the desired size and nailed to the lower end of the tibia the articular cartilage being preserved. A circular plaster of Paris dressing was applied.

At the end of three months considerable union had occurred on the fibular side, but it was not strong enough to permit of weight bearing. After five months the patient could walk with a cane without difficulty. The normal line of the leg and foot had been restored. There is no eversion of the foot. There is some restriction of motion at the ankle joint but the range of motion is good.

In a second case of Pott's fracture the foot had evidently been dressed in extension and when the cast was removed the patient walked upon the toes being unable to place the heel upon the ground.

CASE 7 Mr B age 37, a blacksmith was admitted to the Presbyterian Hospital April 21 1914. Eight weeks before while scuffling he twisted his ankle and sustained a fracture of the left leg. This as revealed by the X ray was a typical Pott's fracture. A cast was applied after the leg had been in splints for ten days. As stated above the foot had evidently been dressed in plantar flexion for when the cast was removed the heel could not be placed upon the ground and the function of the foot was greatly impaired.

Upon examination the foot was swollen cyanotic and sweated rather profusely. The foot could not be flexed dorsally. Limitation of flexion in this direction was due apparently to outward displacement of the internal malleolus for this part of the bone seemed to impinge upon the astragalus when dorsal flexion was attempted. Definite points of tenderness were found over the malleolus at the site of fracture and over the fibula. On April 22 an operation was undertaken with the view of correcting the position of the malleolus. A curved incision was made over the medial malleolus. This was divided at the point of junction with the shaft and dissected out of the scar tissue extending from the deltoid ligament to it. It was removed and wrapped in gauze as transplantation was planned. Considerable intra articular callus and connective tissue were found closely adjacent to the malleolus. These were dissected away. The foot could then be brought to a right angle position and was inverted. The malleolus was then nailed back into place. The foot was immobilized for ten weeks in a plaster of Paris cast after which the patient was encouraged to walk and passive motion and massage were resorted to. At the end of four months the patient

walked normally and the function of the ankle joint was practically normal.

It has been suggested in both of these cases that the malleolus could have been turned downward with the deltoid ligament after having been divided. As good a view of the joint could have been obtained had this attachment been preserved but transplantation to the desired position would have been impossible for the deltoid ligament becomes so contracted in these cases as not to permit of displacement of the malleolus into the position which permits of correction of the deformity of the foot. In both cases the malleolus has survived after direct transplantation.

BOVE GRAFTING IN DELAYED UNION AND IN NON UNION OF FRACTURES

Statistics which have been recently published indicate the unreliability of the Lane plate or other foreign materials in the treatment of delayed union or non union of fractures. The bone graft is being more and more frequently employed in these cases for the graft apparently stimulates bone growth in the fragments and the osteogenetic power of the graft proper aids greatly in forming a firm union between the ununited fragments. In reconstructive work upon the extremities where tendons and nerves and bone have been lost bone grafting has wide possibilities. The length of time required for bony union in these cases renders postponement of the tendon grafting necessary for early assumption of function which is not possible until there is considerable union is necessary to successful tendon transplantation.

The use of the bone graft in reconstructing bones and in delayed union and non union of fractures is illustrated by the following cases.

CASE 8 Mr C L age 42 was admitted to the Presbyterian Hospital November 1 1912. He had sustained a fracture of the right tibia four years before. The fracture was compound the lower end of the upper fragment protruding through the wound. Later the fragments were placed in position occurred and two months after the injury a large sequestrum was removed. The wound healed but there has been no bone repair. There is a defect in the tibia of about five inches. The patient wears a brace and uses crutches.

General physical examination is negative. A false point of motion is found in the lower third of the right leg. The X-ray picture reveals an absence of several inches of bone in the right tibia and a fracture of the fibula. The lower end of the tibia which is a very small fragment is very atrophic. The ankle joint is partially ankylosed. The articular cartilage is apparently preserved and no distinct shadows are found within the joint-cavity.

On November 16, 1914, the two fragments of the tibia were exposed. The lower end of the upper fragment was prepared for an inlay graft. The lower fragment was so short that the graft could not be inlaid and it was therefore driven into the atrophic cancellous tissue of this piece of bone. The upper end of the transplant was fixed to the lower end of the upper fragment by an ivory peg. The subcutaneous tissues were approximated by fine catgut and the skin closed with silk without drainage. A cast was applied and the wound healed by primary union.

Although the conditions necessary to successful bone grafting were provided in this case union has been slow. Repeated X-ray examinations indicated that the transplant was increasing in size. At the end of nine months the cast was removed but as union was not firm an apparatus was worn for some four months to prevent motion between the fragments and transplant and to avoid fracture of the transplant. At the end of fifteen months union was firm enough to warrant the discarding of mechanical supports. The patient now walks well with the aid of a cane. The ankle-joint is still ankylosed and the patient as a result walks with a slight limp.

CASE 9. Mr. G. M., age 63, was struck by an automobile January 17, 1913, and sustained a compound fracture of the right tibia about four inches above the ankle. He was taken to a hospital and the fragments were wired. Apparently the result was not satisfactory for in three weeks another operation was performed and a Lane plate was applied. The plate was removed fourteen weeks after being applied evidently because of a mild infection for a sinus still remains upon the anteromedial surface of the tibia through which probe can be passed down to the denuded bone. There is some seropurulent discharge through this sinus but apparently the infection is very mild. Examination reveals point of non-union about six inches above the right ankle. The fragments move rather freely upon each other. The skin about the scar of the earlier operation is reddened and covered with crusts. There is considerable discharge from the sinus mentioned above. An operation was performed January 30, 1914, for non-union. A curved incision was made through the skin and the small discharging sinus was carried up into the flap. The ends of the fracture were exposed and the scar tissue and a small amount of callus were dissected away. The ends of the bone when exposed were prepared for a graft. The ends of the fragments

being cut so that the marrow-cavity was exposed. A graft measuring about 4 1/2 inches was then taken from the anteromedial surface of the tibia and placed in the grooves already prepared in the fragments. The skin was closed with silk worm gut and silk. Healing without suppuration occurred. The small discharging sinus closing within ten days. A plaster of Paris cast was applied for fixation.

X-ray examinations made from time to time indicated that the graft was alive but union occurred slowly. As late as October it was thought best to use a cast as there was still some motion. During the latter part of October the cast was removed and an apparatus constructed which could be worn attached to the shoe. This was not successful. During the latter part of October and the beginning of November consolidation occurred rapidly and all fixation apparatus could be discarded. Union occurred rapidly after consolidation began. The patient still uses a cane but the function of the leg has been practically restored to normal.

CASE 10. M. K., age 35, received a fracture of the left leg while working in a coal mine. The fracture was reduced and immobilized but when the cast was removed there was some deformity. When the patient attempted to walk he experienced considerable pain at the site of the fracture where there was a distinct false point of motion. Considerable tenderness could be elicited by pressure over this point. Because of the deformity and pain with the delayed union after four and one-half months an operation was performed with the idea of correcting the deformity and promoting union by skin grafting.

An X-ray examination revealed an oblique fracture of the left tibia. The lower end of the upper fragment overriding the upper end of the lower fragment. Operation performed April 18, 1914. A curved incision was made and a flap raised from the anteromedial surface of the tibia, exposing the line of fracture. The bones were refractured in the line of the old fracture and the ends of the fragments were displaced out so that the ends could be sawed off converting the oblique into a transverse fracture. The ends of the fragments were prepared so that a groove was made for the reception of the transplant taken from the anteromedial surface of the tibia. Under traction great enough to separate the ends of the fragments so that there would be no shortening the graft was placed and fixed with two steel wire nails. A plaster of Paris cast was then applied. Union occurred rapidly in this case. In four months union was firm enough so that the fixation apparatus could be dispensed with. The patient experienced no pain and the function of the part was completely restored. Later the patient returned to have one of the nails, which had become loosened and could easily be felt beneath the skin removed.

CASE 11. R. K., age 25, was admitted to the hospital January 10, 1914. He gave the following history: On October 6, 1913, while working with



Fig 1

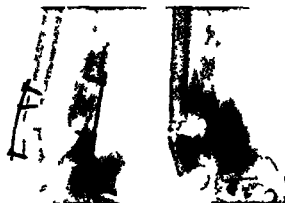
Fig 2

Case 1: Fig Showing in olucrum and sequestrum formation occurring; transplanted bone when infection occurs

Fig The in olucrum which has increased size. The sequestrum was removed at operation and the point at which the involucrum had formed could be definitely seen. This reaction of transplanted bone to infection indicates that the bone remains viable and that the periosteum plays an important rôle in the host reaction of compensation.

an eleven foot sheet metal shears his right forearm slipped into the gearing. The radial side of the arm was badly torn and about six inches of the radius was badly splintered so that part of it had to be removed. The sleeve of his jacket and gloves were ground into the wound and had to be removed during the operation. Attempts at tendon repair were made immediately but infection occurred and the attempt was not successful. The extensor tendons on the radial side together with part of the common extensor had been destroyed. There was some contracture of the flexor longus and brevis pollicis muscles and the thumb was consequently drawn well into the palm of the hand. A large ulcer was found upon the radial side of the forearm which began just above the wrist and extended upward beyond the junction of the middle and lower third of the forearm.

The first operation performed January 23, 1914, consisted of skin grafting. The scar tissue was dissected out about the ulcer, a flap with double pedicle was dissected upon it from the abdomen and



Case 2: Infected compound fracture which had been plated. Sequestrum has formed in shaft of radius above upper end of plate. Line of separation can be clearly seen. Involucrum of sufficient strength had formed to prevent radial deviation of hand. The transplant was removed from the tibia and inserted into the infected area to act as a mechanical support. Wound closed with drainage. Healing within ten days followed by usual formation with discharge of small particles of bone. Sequestra later removed from transplant. Transplants placed in infected areas will. In involucrum and sequestrum formation may occur; the transplant indicating that transplanted bone remains viable and does not act merely as a scaffold for osteoblasts.

the hand and forearm placed beneath this flap which was sutured to the edge of the wound. The edges of the defect were approximated by silk worm gut sutures beneath the hand in this position. A cast was applied to hold the hand in position. Ten days later the pedicles were cut and the hand freed.

The second operation performed after the flap had completely healed consisted of bone transplantation. The skin graft was dissected up and a bone transplant taken from the anteromedial surface of the tibia was prepared. The graft was fractured in the lower half during preparation but the periosteum remained intact. There was considerable oozing from the dense scar which was controlled with difficulty. The graft was fixed to the fragments with ivory bone pegs and the skin flap was sutured over it without drainage. Considerable oozing occurred beneath the flap. Union did not occur and repeated X-ray examinations revealed gradual absorption of the graft without any evidences of repair. On October 10, 1914, as the graft was gradually being absorbed it was removed and another graft taken from the anteromedial surface of the left tibia was inserted. The graft was better prepared than the first. Again there was considerable oozing with discharge between the stitches but oozing soon ceased and the wound healed. Beginning solidification of the graft was noted within four weeks after the operation and X-ray examination revealed distinct evidences of new bone formation. This was the second step in an operation



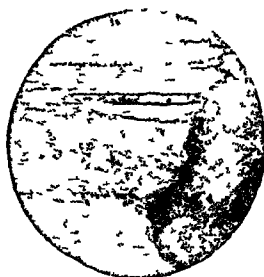
Fig 2

Fig 3

Case 3 Fig 2 Osteomyelitis of the radius resulting from a infected compound fracture. Operation eight weeks after accident. Sequestrum in radius removed and a transplanted bone inserted into infected field. Transplanted bone inserted; it is voluminous and contains with the epiphyseal cartilage. No attempt made to fix the transplant.

Fig 3 Indicates condition of transplanted bone at end of fifteen weeks. Site has healed. Small fistulae on radial side has developed over lower end of radius on radial side. The X-ray indicates that transplanted bone infected field has remained viable and increased size.

designed to reconstruct tendons by fascial transplantation. As union is being established the



Case 4 Fig 3 Histological preparation of the graft. The transplant is dead and is being rapidly destroyed by granulation tissue.

repair of tendons by fascial transplantation can now be attempted.

I believe that the absorption of the graft was due to hematoma formation following oozing from the catenical tissue. A hematoma prevents vascularization of the transplants and is one of the factors which causes the death and subsequent absorption of transplanted bone. This is a factor which must be considered in all cases in which bone



Fig 1

Fig 2

Fig 3

Case 4 X-ray showing changes occurring transplanted bone placed in cavity resulting from curettage of a central giant cell sarcoma.

Fig 1 Picture taken one week after operation. Fig 2 Picture taken one year after operation shows absorption of graft. Gradual obliteration of the cavity

has occurred. Result of proliferation of the thinned cortical bone.

Fig 3 Appearance of the bone seventeen months after primary curettage. The bone transplant has been removed and the cavity filled with Moench's plug most of which has been extruded.



Case 5 Central giant cell sarcoma of five years' standing treated by curettage. Bone grafts were placed in the cavity and these had to be removed subsequently. The third figure reveals cavity after being filled with a Moser's Moorhoff bone plug—two years after curettage. The

cavity surrounded by heavy sclerotic bone which has been formed from the thin end cortex shown in the first figure. The second figure reveals condition after bone transplant has been inserted in the cavity. A bone transplant

is transplanted into extensive defects in which scar tissue is abundant.

CASE 12 Mrs E. W. age 65 was transferred from the medical service of the Presbyterian Hospital. She gave a history of a pathological fracture through the shaft of the right humerus. There had evidently been some attempt at repair but subsequently the fracture was refractured at the same point. The patient complains of pains in the muscles of the back which become very acute when movements are made. These pains radiate down the back of the right thigh. Examination reveals no evidence of tubercles and no primary tumor which might give rise to secondary bone growths could be discovered. The severe radiating pains in the extremities could not be readily accounted for. There were no Ben Jones bodies in the urine.

The patient was operated upon February 10, 1914. An incision was made on the outer surface of the arm down to the site of fracture. The end of the fragments could then be displaced outward. The bone was cup shaped at the end of either fragment and in the bowl of this cup-shaped cortical bone was an organized hematoma and tissue which resembled histologically a myeloma.

The thin bone forming the expanded part of the cup was partially cut away and the tissue occupying the space between the fragments removed. A transplant was then removed from the anterior distal surface of the left tibia and placed in the defect in the bone. An intramedullary splint was fixed to the lower end of the transplant and was fixed to the lower fragments with a drill point. The upper

end of the transplant was fixed to the lower end of the upper fragment with chromic catgut. The incision was closed without drainage and the arm

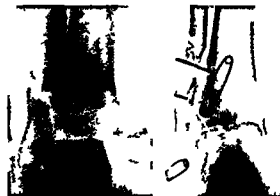


Fig.

Fig.

CASE 6 Fig. Attempt to correct malposition of Pott's fracture associated with dislocation of foot and deep injury to foot. The medial malleolus removed and cut down to the desired size the articular cartilage being preserved and then transplanted. A part of the fibula resected to permit of overcorrection of foot. Transplant removed from the anteromedial surface of the tibia and inserted into the defect. The articular callus in the malleolus dissected after the malleolus removed.

Fig. Indicates condition of the transplanted bone six months after the operation. A small dissection in the medial malleolus has been removed.



Fig 2

Case 7. Correction of deformity associated with imperfectly corrected Pott's fracture by direct transplantation of the medial malleolus and removal of traumatic callus.



Fig 3

Fig 2 on toes.
Fig 3 planted restorer.



Fig 4

Foot as in extended position and patient walks on toes.
Shows relations after malleolus has been transplanted. Foot dressed at right angles with complete of function.

Fig 2. Reveals fracture and displacement of malleolus.

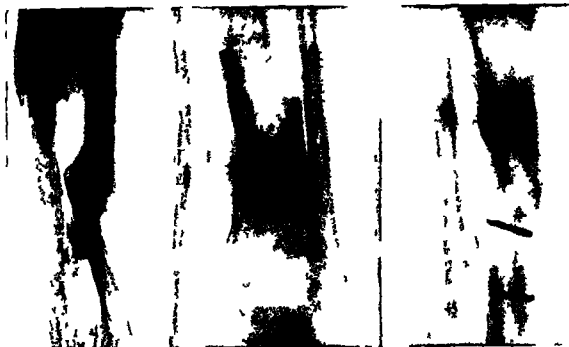
was immobilized. X-ray examinations made from time to time indicated that the transplant was alive and gradually fixation took place. During the stay in the hospital the patient frequently complained of severe radiating pains in the upper extremities but no evidences of any other bony growths, primary or secondary could be found. The general health of the patient did not improve. It seemed to remain stationary.

The patient left the hospital June 24, 1914, having been sent to a charitable institution. She died in July when I was out of town but I learned that when an examination was made in an undertaking establishment a fracture was found. I believe that the fracture of the transplant occurred when the body was being prepared for when the patient left the hospital union was fairly well established but a mechanical support was still worn to prevent fracture of the transplant. X-ray examination revealed no absorption of the graft and there were definite evidences of proliferation changes.

The bone graft is being used more and more in the treatment of united intracapsular

fractures of the neck of the femur. The transplant has many advantages over foreign bodies for it has proliferative power and an attempt can be made to reconstruct a neck with proper angle and of normal length. In the case about to be reported the head of the femur even when immobilization has been maintained has undergone partial absorption.

CASE 13. G. W. male age 14 was admitted to the Presbyterian Hospital March 27, 1914. He jumped from a platform July 5, 1913 and fell upon his left hip striking upon a cement pavement. He attempted to ride his bicycle home but fell and had to be carried there. About two hours after the accident he began to have severe pain. A doctor was called that night. Extensile was put and the patient kept in bed three weeks. At the end of that time he was up in a chair and then began to walk with crutches. When he attempted to walk he suffered severe pain and the thigh became adducted considerably. Adductor spasm being noted.



Case 8

Case 9

Case 10

Case 8 Reconstruction of the tibia by bone transplantation after part of it had been removed following an osteomyelitis developing after compound fracture. Appearance of the transplant two years and three months after operation.

Case 9 Delayed union following infected compound fracture. Discharging sinus present when transplant

was inserted. Inlay graft. Union after seven months.

Case 10 Delayed malunion of an oblique fracture of the tibia. Pain made so that the patient had to use crutches. Inlay graft. Union four months with disappearance of the pain. Steel wire as it had to be removed subsequently as it had become loose. Fracture consolidated from oblique to transverse.

The symptoms gradually increased in severity and an examination made when the boy was brought to the hospital revealed an inversion of the left foot, a spasm of the adductor muscles of the thigh and a high position of the trochanter. Shortening of 5 cm was determined by measurements. An X-ray examination revealed a fracture of the neck of the femur through the narrow part. A push and pull X-ray indicated that there had been no attempt at bony union.

An operation was performed March 27, 1914. A U-shaped flap was turned up over the great trochanter and the fascia lata and muscles over the same exposed. The tensor fasciae lata was incised and the anterior part of the capsule of the hip joint exposed and opened. When the capsule was opened the seat of the fracture was found. No attempt was made to freshen the entire surface of the fracture but an area was denuded into which the transplant was to be driven. Traction was put upon the extremity so that the requisite amount of lengthening was obtained and the two fragments were separated. A canal was then bored through the shaft of the femur at the base of the trochanter through the distal part of the neck. The bone

transplant taken from the anteromedial surface of the tibia was driven through this canal, an attempt being made to form by the transplant a neck as long as the original one with the same angle. No attempt was made to fix the transplant for it was so tight that it could not be displaced. A cast was then applied which extended from the level of the navel to the ankle. The patient returned from time to time for examination. By the middle of September there was some bone formation at the lower part of the neck as indicated by the X-ray and the push and pull X-ray indicated that some union had occurred. The cast was removed a week before Christmas and there was at that time an inch and a quarter of shortening. Passive motion at the hip was not painful and there was no evidence of an adductor palsy. The patient could walk with crutches without much pain. An X-ray examination indicated that absorption of the head had occurred although the outlines of the articular cartilage could still be made out. The bone transplant was still in position and apparently had not undergone any absorptive changes, considering the new bone being formed at the lower side of the neck.



C. Second attempt to reconstruct the right distal tibia. Skin graft taken from the left tibia. Graft lost probably because of hematoma formation. Second bone graft has been taken. Consultation is taking place and attempt has been made to repair the extensor longus pollicis and extensor carpi radii longus tendons by fascial transfer and plantar flexion.

Lever makes the following statement concerning bone bolting which is practically the procedure employed in this case. The canal should not be made too wide as the bolt must be inserted forcibly so that blood and detached marrow cannot collect between it and the bone since the bone will unite with the surrounding bony tissue only when it lies in intimate contact with it otherwise granulations appear in the wall of the canal interfere with nutrition and predispose to rapid absorption. A too narrow canal may interfere in some cases with the transplant for in driving the latter through the canal the periosteum may be stripped off and absorption take place subsequently. Both experimental and clinical work have demonstrated conclusively the necessity of preserving periosteum in all cases of transplantation for proliferative changes occurring in it are essential to the life and later development of the transplant. In this case although healing by primary union took place and good immobilization was obtained for a number of months I believe that the stripping up of the periosteum when the graft was inserted had considerable to do with the failure of the head to regenerate completely and secure a reconstructed neck of the femur.

Bone grafting is the procedure to be preferred in the closure of defects in cranial bones and the great percentage of successes following its use has resulted in the much less frequent use of silver and celluloid plates and those composed of other foreign material. The repair of such defects can easily be accomplished by plates covered with periosteum cut to the diploe taken from bone adjacent to the defect. Ropke has suggested that a portion of the scapula be used for the repair of such defects for in this way bone with periosteum on each side is secured and there will be less likelihood of proliferative changes leading to an uneven surface or the formation of exostoses. In traumatic cases bone is-



C. Pathological fracture due to a myeloma. Resection of bone followed by bone transplantation. The patient left the hospital there was considerable union but immobilizing dressing could not prevent fracture of transplant. See case history.



Fig 1

CASE 13 Fig 1 Attempt to reconstruct neck of femur by bone transplantation. Head absorbed spite of fixation extending over almost one month. One and on half



Fig 2

ches of shortening. Patient has good function. Fig 2 Would indicate bone formation occurring in the head but the greater part of it has been absorbed.

cial and fat transplantation are often used together. In the following case bone fat and fascial transplantation were combined in an operation designed to cure a traumatic cyst of the brain and to correct a cranial defect.

CASE 14 A M age 38 was admitted to the Presbyterian Hospital November 11 1917. Two and one-half months before he was struck on the head with a billiard cue. At the hospital a piece of bone was removed but closure of the wound did not occur for almost two months. The patient was in the hospital for four weeks after the injury. He could not move leg or arm or opposite side for three days after the injury. He could not walk for about six weeks after the injury. There was no history of epileptic seizures and the general examination was negative. A scar was found upon the left side of the head near the median line. It measured about two and one-half inches in length and one and three-fourths inches in width. A distinct pulsation could be felt over the scar. A crescentic flap was dissected up from the defect the scar in the flap being quite adherent to underlying tissue. The dura seemed to be in good condition and as there were no focal symptoms a pulsation was good the dura was not opened. The periosteum of the edges of the defect was dissected up a bone graft was then taken from the anteromedial surface of the tibia. This was divided and the fragments were placed over the defect resting upon the edges of the bone. The periosteum of the transplant was sutured to the periosteum of the cranial bones. The flap was sutured over the transplant with fine silk. When seen some three months later the defect was solidly closed but a small sharp spicule of bone could be felt close to the skin. This was not removed. The patient has not been heard from lately.

CASE 5 L M age 21 was admitted to the Presbyterian Hospital October 13 1913. When twelve years old he sustained an injury of the head in a machinery accident. He was partially confined to his bed for a month. He had no trouble then for about eight years when he began to have dizzy spells during which he would lose consciousness. As described by him these attacks were typical epileptic seizures. The attacks came at irregular intervals but during the past year he had had ten attacks two of these occurring during the last month. No history of a distinct aura could be elicited. There was an old depressed scar over the left frontal and parietal region about one and a half inches from the median line. There was a distinct depression the size of a silver dollar and bone had evidently been removed at the time of the injury. The general examination was negative.

A U shaped flap including the old scar was dissected up exposing a scar in the dura. When the cicatricial dura was incised and dissected away a cyst containing an ounce of clear fluid was found between it and the arachnoid. This cyst which had a well defined wall was evacuated. A flap was then dissected up over the anteromedial surface of the tibia. A piece of subcutaneous fat was removed and this was placed in the cavity of the cyst. A flap of fat was removed and this was fixed by three sutures of fine silk to the edges of the cicatricial dura which had been removed. A bone graft taken from the anteromedial surface of the tibia was prepared and this was placed in the cranial defect. The transplant resting upon the edges of the defect was fixed to the surrounding tissues the periosteum of the transplant being sutured to the pericranium. The U shaped flap was then sutured over the transplant with fine silk sutures. Healing by primary intention. This patient had no convulsions fifteen months. Then one of considerable severity occurred.



Fig 1

Case 4 Fig 1 Defect in skull closed by bone transplanted from the tibia



Fig 2

Fig 2 Three months after the transplantation

SUMMARY

1 Experimental and clinical work demonstrates that the compact bone in a bone graft is gradually absorbed that it is replaced by new bone formed from the periosteum and endosteum of the graft. The periosteum of bone into which the graft is inserted also

plays an important rôle and should be saved and brought in contact with the periosteum of the transplant or over the ends of the same. This is now admitted by Barth who first stated that a bone graft had merely an osteoconductive function.

2 The viability of bone grafts is especially well indicated by their reaction to infection for involucrum and sequestrum formation occurs in infected grafts or in those placed in infected areas as it does in normal bone.

3 Bone grafts placed in cavities, resulting from curettage of central giant cell sarcomas or fibrous osteitis will not survive in most cases, for the hematoma which occurs within the cavity prevents vascularization of the graft. The cavities can be closed most satisfactorily by a bone plug of some kind.

4 The inlay graft in the treatment of old ununited or recent fractures is more satisfactory than the intramedullary splint for the endosteum of the graft comes in contact with the endosteum of the bone and periosteum of the bone can be sutured to the periosteum of the graft. In the intramedullary splint considerable endosteum is destroyed in preparing the medullary cavity for reception of the graft and the endosteum is one of the important factors in bone repair.



Fig 3

Case 15 Fig 3 Defect in skull associated with epilepsy. At operation cyst containing about an ounce of fluid was found beneath the scalp dura and the pia-arachnoid was removed from the leg was placed in the cavity. The intracranial dura removed and replaced by a fascial transplant and the defect in the bone closed by grafts from the tibia. Patient has recently had convulsion about fifteen months after the operation. General condition much improved.

Fig 2 Shows defect before bone transplantation

5 Compact bone dies in the graft because of its physical properties which do not permit of rapid permeation of serum. The best bone graft contains enough compact bone to give form and maintain fixation and also contains periosteum and endosteum from which the compact bone is substituted. Grafts taken from the anteromedial surface of the tibia are to be preferred to those taken from the crest.

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EMPYEMA OF THE THORAX¹

II A CRITICAL STUDY OF EIGHTY-TWO CASES OF CHRONIC EMPYEMA SINUS OF THE CHEST TREATED AT MOUNT SINAI HOSPITAL NEW YORK IN THE PERIOD OF TEN YEARS FROM 1903 TO 1913

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In the first paper of this series a study was made of two hundred and ninety nine cases of acute empyema of the thorax occurring in both children and adults in the wards of Mount Sinai Hospital in the period of ten years from 1903 to 1913. From these detailed studies it was possible to conclude as follows:

1 In the vast majority of the cases empyema of the thorax is secondary to some other inflammatory lesion in the body.

2 The average mortality for our series was 28 per cent varying from 50 per cent in infants to 18 per cent in adults. This mortality is one of the lowest published and in some reports is said to be as high as 75 per cent.

3 The most favorable period for recovery is that between three and ten years of age.

4 Twenty per cent of the patients die as a result of the primary disease such as a pneumonia or of a recurrence of it or because of other complications or intercurrent disease. Eight per cent die because of their empyema half of these within the first two days. The primary disease contributes to the greatest degree toward this immediate operative mortality. The true mortality for empyema

of the thorax is therefore between these two figures between 4 and 8 per cent.

5 Twenty three per cent of the patients who recovered that is one out of every four had more or less trouble with the healing of their sinuses. This state of affairs is in harmony with that reported from other large hospitals in this country and abroad.

In this communication a detailed study of our experiences with chronic empyema sinus will be taken up its causes mechanism and pathology and the methods of treatment which have been employed. The term chronic empyema sinus will include all cases having a sinus of the chest wall as a result of operation for empyema which did not heal without further secondary or repeated operative interference.

In the same period of time in which the two hundred and ninety nine cases of acute empyema were treated the opportunity was afforded of taking care of eighty two cases of chronic empyema sinus. Some of these had had the primary operation done at our hospital the remainder at other institutions.

The distribution according to age is shown in the following table:

¹The first paper of this series which appeared in the May issue of this journal was a study of 11 the cases of acute empyema treated in the

	Number of Cases
Under 1 year	2
1 to 2 years	8
2 to 3 years	6
3 to 4 years	7
4 to 5 years	6
5 to 10 years	6
10 to 20 years	15
20 to 30 years	6
30 to 40 years	3
40 to 50 years	6
50 to 70 years	

The time of life which gave us the least mortality has been prolific in the production of chronic sinuses. The period of infancy fortunately escapes with very few chronic sinuses. It is quite possible that this was so because we are in the habit of making intercostal incisions for these little patients and we have found by experience that this method of operating practically never gives any trouble in the healing of the wound.

The periods of time during which these sinuses had existed are shown in the following table:

	Number of Cases
months	3
3 months	6
4 months	5
5 months	5
6 months	7
7 months	4
8 months	4
months	3
11 months	
1 year	0
$\frac{1}{4}$ years	
2 years	3
$\frac{1}{2}$ years	
3 years	6
5 years	3
8 years	
12 years	1
15 years	1
Unknown	3

The records have been gone over carefully and in almost every case we were able to discover a definite cause which accounted for either the delay in the closing of the sinus or in its failure to heal. These causes were:

	Number of Cases
Uncollapsible cavity	43
Tuberculosis of the sinus wall	3
Tuberculosis of the resected rib	1
Necrosis of the resected rib	5
Bony ring & outlet of the sinus	1
Fistula drainage	7
Reinfection	
Bronchopulmonary fistula	4
Bronchopulmonary fistula and lung abscess	1
Lung abscess	
Foreign body the sinus	
Unknown	

All of these may be divided into groups in accordance with the location of the cause of the non healing. The cause may be —

- 1 In the chest wall
 - 2 In the pleura.
 - 3 In the lung
 - 4 In the general condition of the patient
- 1 Causes in the chest wall were usually of no permanency and their correction was easily carried out. They included abscess or cellulitis of the skin around the sinus, an abscess in a partly healed scar or necrosis of the resected rib. There is no record of there ever having been a proved erysipelas infection of the sinus or skin in its immediate neighborhood. Abscess in a partly healed scar testifies to the lack of sufficient drainage or to the too early removal of the drainage mechanism. The abscess may be dormant and cause symptoms several months after the outer wound has healed.

Secondary resection of the infected portion of the rib was sufficient to remedy this condition and in tuberculous cases it was frequently found necessary to repeat this procedure more than once. As a rule even in these cases there was very little trouble. This condition was met with six times and it has always seemed remarkable that more of these bone infections did not occur. Certainly the conditions favorable for its occurrence are always present and yet in the vast majority of the cases this complication is escaped. Like conditions are found in the abdominal wall. In abdominal operations made in badly infected territory we are accustomed to suture at least part of the incision and yet an infection of the abdominal wall is most uncommon. The normal human tissues seem perfectly competent to take care of these auto-infections.

The contributory effect of the chest wall in causing an uncollapsible cavity is mentioned here also. The question will be discussed fully in the appropriate section.

2 The pyogenic membrane which lines the intrapleural abscess frequently becomes very thick and of almost cartilaginous consistency. Such a membrane is just as unyielding as the chest wall itself and prevents the abscess cavity from collapsing. The

tissue forming this membrane may be formed of tuberculous granulation tissue originating in a primary tuberculous pleurisy or as a result of secondary infection by the pus pouring out from a communicating phthisical cavity

In a few cases the cavity was divided into loculi by bands or adhesions and if the communication between these was not large enough the sinuses did not heal or the communication between became closed and secondary intrapleural abscesses formed and sometimes these were latent for months and reappeared as so called new empyemata

The intrapleural abscess may lie at an inaccessible place and the sinus draining it is long and narrow and tortuous. Such an abscess never heals until more direct and freer drainage is established. If it has been allowed to go on for a long time the cavity also becomes lined with a rigid uncollapsible membrane which may have to be excised according to the methods described later before healing can be obtained

The cavities have varied from those of small size to those as large as the interior of one half of the chest. A narrow sinus may attain the characteristics of such a cavity and may also be lined by a hard rigid wall

It has happened that the sinuses have not healed because foreign bodies such as tubes or gauze packings were accidentally forgotten and left in these cavities. Healing was generally rapid after proper treatment had been carried out but just as often the sinus did not heal because a rigid walled cavity had had time to form before the foreign body was removed

3. A pulmonary abscess may be the cause of the empyema or may itself on exceptional occasions be caused by the pleural exudate. In either case the secondary abscess is brought about by a gradual ulcerative process and the resulting fistula may extend into the lumen of a larger or smaller bronchus. The bacteriological cause may be the ordinary pus producing organisms or the tubercle bacillus. The lung abscess itself may have originated in an infected bronchiectatic cavity. A chronic empyema sinus usually forms under any of these conditions

The pulmonary abscess complicating the empyema sinus has usually been single. It may be situated directly under the surface of the lung (Fig 1) and then the communication is made by means of an opening whose caliber is much less than that of the abscess cavity itself. Drainage takes place into the intrapleural space and the communicating opening being usually small the drainage is insufficient and retention occurs. Healing never takes place under these conditions and to add to the difficulties the abscess in the lung gradually acquires a rigid wall. When the drainage is ample no retention occurs and the pulmonary abscess collapses quickly and heals. In the former case the healing of the empyema sinus is retarded or prevented in the latter there is little or no interference. When the pulmonary abscess formation is multiple these conditions apply to each focus independently of all the others

The pulmonary abscess may be in the depths of the lung parenchyma (Fig 2) and the communication with the empyema sinus is established by a fistulous tract usually of narrow caliber. Under these conditions there is always insufficient drainage the pulmonary abscess acquires a rigid uncollapsible wall and very frequently communication is established with a bronchus by a gradual ulcerative process in an attempt by nature to increase the drainage from the suppurating focus. The communicating empyema sinus remains open indefinitely

Bronchopulmonary fistula may complicate any of these conditions. The fistula may be a narrow straight or tortuous tract (Fig 3) which connects the skin with the interior of any of the bronchi. Such a fistula results in several ways through the rupture of a primary or intermediate pulmonary abscess exceptionally through the rupture of an empyema directly into a bronchus or as a result of some operative procedure such as decortication of the lung. Spontaneous healing occurs rarely with the first two of these methods of production and commonly with the last.

The fistulous tract may be broken by the intermediation of an abscess somewhere in the lung parenchyma (Fig 4). Similar



Fig



Fig

pathological lesions are reproduced as were discussed under pulmonary abscess, and likewise a persistent sinus results.

The fistulous tract is expanded in the region of the pleura to a relatively small cavity. These never are as large as the cavities one sees when no fistula is present (Fig 5). The chronic empyema sinus which results remains open indefinitely.

When pulmonary abscesses or bronchopulmonary fistulae have existed for some time a certain amount of bronchiectasis is apt to form around these lesions in the lung. The degree of the bronchiectasia may be very small or very marked and in the latter case the process acts as an added hindrance to the healing of both the pulmonary and the pleural condition owing to the powerful retraction it causes in the lung tissue and the tendency this will have to the formation of rigid uncollapsible cavities.

The amount of discharge from the external

openings of these bronchopulmonary fistulae was usually small. The amount of exudate which was discharged in the putum was usually abundant but it was difficult to determine how much of it was due to the fistula and how much to the associated catarrh of the bronchi which with most of these cases was fairly well marked.

The diagnosis of bronchopulmonary fistula complicating empyema is not always easy and is usually first thought of when an empyema sinus remains open for a long period of time. Frequently the patient appreciates the fact that with inspiration and expiration air passes inward and outwards through the sinus in the chest wall in addition to through the normal channel. This usually means that the fistula is of large caliber or that the bronchial opening is very superficial and the communicating bronchus of large size. On several occasions the first suspicions of this complication were aroused when the

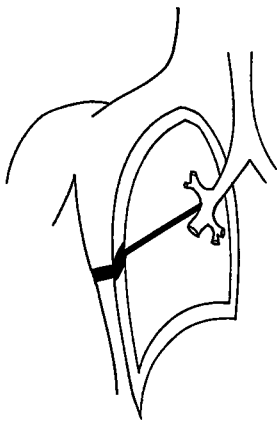


Fig 3

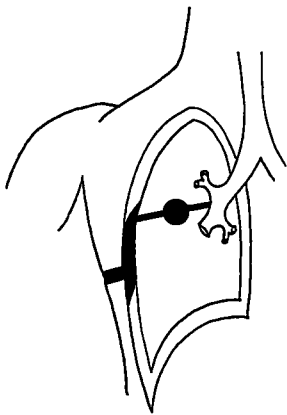


Fig 4

patient complained of tasting the various drugs which were applied or injected into the interior of the sinus.

In the last ten years the diagnosis of this complication has been based upon the radiographic demonstration of the sinus when injected with some emulsion of bismuth¹ or other substance impermeable to the X-ray. Sometimes this finding has been accidental as when the radiograph was employed to outline the size and location of an empyema sinus and a bronchopulmonary fistula was demonstrated in addition. This occurred in our earlier experiences. In more recent years this method was employed advisedly in the expectation of demonstrating this complication as the cause for the non-healing of the sinuses. With a few patients it has happened that these substances when injected for radiographic purposes were brought

up in the sputum either stormily at once in a fit of coughing or more quietly within the next few hours with the ordinary sputum of the patient. This established the diagnosis at once. In the former patients the fistulae were either large or communicated directly with a large bronchus in the latter the tract was long and tortuous and the bronchus was at a distance. The occurrence of this phenomenon never seemed to have any harmful effect.

These conditions in the lung that is, abscess or bronchopulmonary fistula or both of these together bear the same relation to the empyema that a perforated appendix bears to an appendix abscess or to the consequent purulent peritonitis. In order to obtain healing it is an absolute necessity that the primary condition at fault be corrected.

The cause for the retardation in the healing or for the failure to heal was in more than 50 per cent of our cases an uncollapsible

¹ Emulsion is needed with bismuth emulsion here composed of bismuth as several sets of patients have been reported.

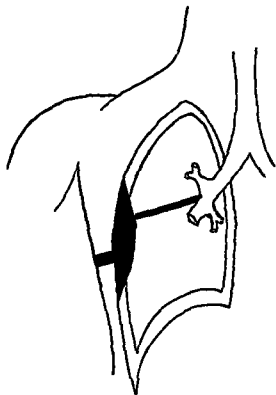


Fig 5

cavity. The structures entering into the formation of such a cavity are the chest wall, the pleura, and the lung.

An empyema of the thorax is mechanically an abscess walled in by the chest wall on the one hand and by the lung on the other, each of these covered by its appropriate portion of the pleura. Thus intrapleural abscess as it develops, takes up a certain portion of the space which the lung normally occupies. The space may be very small or it may be as large as one-half or more of the chest. The size of this space may be limited at its very inception by the character of the primary focus as in an encapsulated or interlobar empyema, or it may involve the entire pleural surface and a huge exudate quickly forms which crowd the lung out of the way until it shrivel up over its hilus in the postero-internal part of the chest.

The extent of the adhesions which form in the chest between pulmonary and parietal

pleura for the purpose of walling off the abscess varies inversely with the rapidity with which the exudate forms. When it forms slowly the adhesions have time to form and the abscess is circumscribed; when it forms rapidly the adhesions have no time to form and the only limitation to the extent of the suppuration is the size of the chest.

In either case the adhesions between visceral and parietal pleura lie along lines which in the normal anatomical relations of these membranes are not in the same plane. When the abscess is small the difference in level at the line of adhesion may be that of one or two intercostal spaces. When exposed during operation the finger appreciates this as a comparatively small cavity which is walled in on all sides. When the lung is shrunk up entirely on its hilus it is generally found that the anterolateral surface of the lung has swung around upward and backward on the sharp anterior margin of the lung as a center and that the posterior surface of the lung has become obliterated. The line of adhesion extends along a line running across the concavity of the angles of the ribs close to the vertebral column and is made by the lateral margins of the lung and the parietal pleura a short distance from its reflection from the mediastinum. In a fresh case this is easily appreciated as a distinct groove in the posterior part of the chest. The finger can easily cause a separation along this line and then the lung is seen to expand and to assume its normal contour in the opposite direction from that described above.

The mechanical conditions in the thorax at this stage of the process are as follows: A cavity is present bounded on the one side by a rigid bone containing wall and on the other by an extent of pleural surface just long enough to reach in a straight line between the margins of the abscess and not long enough to apply itself to the extent of the curve as formed by the chest wall. Mathematically speaking the pleural surface is a chord which subtends the arc of a circle formed by the chest wall. Such a cavity cannot be obliterated by the collapse of its walls because of the rigidity of the ribs on the outer side and an unyielding membrane

on the inner side which even under forced expansion will not stretch long enough to apply itself to the internal aspect of the chest wall. An uncollapsible cavity results.

Conditions were usually such at the primary operation which in most of the cases consisted as was pointed out in the first paper of making an incision with or without rib resection and inserting tubes for drainage. If the opening made in the chest wall is as large as or larger than the diameter of the main bronchus entering the affected lung with each inspiration the effect of the air entering the lung by the bronchus in its endeavor to expand the lung and obliterate the cavity will be counteracted by an equal or larger air pressure produced by a current of air simultaneously entering the pleural space through the sinus in the chest wall. The mechanical conditions of the abscess are not improved the abscess cavity does not collapse and acquires a rigid wall formed by contracting scar tissue. An uncollapsible cavity results which serves to keep the sinus in the chest open indefinitely. This can be prevented by making the drainage incision in the chest of smaller diameter than that of the main bronchus and by excluding air from the pleural space by an air tight dressing or by the employment of some form of suction drainage. Healing has generally occurred when the intrapleural abscess has been of small or comparatively small size. When the cavities are large the frequency of chronic sinus formation becomes proportionately very large. This is well borne out by the large number of our cases in which the empyema sinus resulted from just such a cavity.

When huge cavities exist for some time marked deformity of the chest is very apt to develop in the form of a lordoscoliosis of the spine. The ribs show a tendency to approach one another and in the neighborhood of the sinus new bone may be thrown out under the costal surface of the pleura.

All of these conditions simple sinus, smaller or larger cavities, pulmonary abscess or bronchopulmonary fistula may be further complicated because of a tuberculous origin. The tuberculous tissue has the tendency to spread outward from its original focus and to

involve the granulation tissue lining the cavity and the sinus. These are the most difficult cases to heal. Operations become multiplied and grow more formidable and still the tuberculous infection prevents the healing.

4. The general condition of the patient is an important factor. This may be influenced by marantic conditions in infants by the undermining powers of chronic septic states and by the debilitating effects of tuberculosis or syphilis. Each of these must be fully considered before satisfactory healing can be expected.

Methodical efforts directed toward the cure of chronic empyema sinuses were not in general use until the second half of the last century. In 1870 Simon (1) and Quenu (2) were treating these sinuses by simple thoracoplastic measures. Following them Estlander (3) described his well known method. At the Ninth Congress for Internal Medicine in Vienna in 1890 Schede (4) advised extensive resection of the chest wall for the cure of these cavities, an operation which has since been known by his name. The method was modified by Depage.

All of these operations attacked the subject by dealing with the bony case of the thorax and it remained for Delorme (6) and Fowler (7) to point out that in certain cases the adhesions between visceral and costal pleura were caused by dense scar tissue which prevented the cavities from collapsing. They proposed liberating the lung by removing this dense layer of scar tissue thus allowing the lung to expand. These are the methods which have been employed unchanged until the present day.

In the following table the methods employed in our hospital are tabulated and the results indicated. Some of the patients were first treated by some of the simpler method and when these failed they were subjected to the more difficult and extensive procedures.

In the last six or seven years attempts were first made in this class of cases to obtain healing of the sinuses by the injection of emulsions or more solid preparations of iodoform or bismuth after the method of Beck. The injections were made on successive days or at intervals of several days.

Methods of Treatment	No.	Im- proved	Not im- proved	Deaths
Iodoform wax filling		1	1	
Smooth subcarbonat filling				
Revision once	16	4	3	1
Revision twice				
Revision thrice			3	
Revision numerous			3	
Revision sequestrectomy	5			
Thoracoplasty	15		6	4
Thoracoplasty and bone-wax filling				
Flender thoracoplasty			2	
Schede thoracoplasty	6			
Schede with pleural dissection				
Depage thoracoplasty	1			
Delorme operation	3			
Scapula implantation	2			
Exploration and sut. re of lung				
Operative treatment 5 cases results not known				

depending on the individual operator. Results have not been as good as were expected and have not justified their continued use.

When the wounds failed to heal in the expected time the patients were taken to the operating room and under anesthesia the cause for the delay in the healing was looked for. Drainage was improved tortuous tracts were simplified and laid wide open and if necessary necrotic portions of the resected ribs were removed. Such a procedure is designated a revision in our records. It was often necessary to repeat this procedure more than once.

In some of the cases a long narrow and oftentimes tortuous tract was found running under the chest wall and barely large enough to admit a large sized probe. The amount of discharge was usually negligible. This would continue in an unchanged condition for weeks and months. It was found necessary in these patients to resect the ribs overlying the sinus for a short distance on either side—and this might include as many as five or six ribs—and so furnish a long shallow channel whose floor was the sinus in order that healing might take place from the bottom. Healing was always obtained after this operation.

Several times during the course of this procedure an abscess was found at the end of the sinus either intrapleural or intrapulmonary. The discharge from the sinus in such a case was frequently abundant but just as often was as scanty as when no such

abscess existed. More direct drainage could be established and if the abscess wall was dense and rigid it could be partially or wholly excised.

These measures are classified as thoracoplasties in our records. Frequently they were much more complicated than those just detailed without attaining the characteristics of the methods described by Estlander, Schede, Depage and Fowler and Delorme. These latter methods have not been employed as frequently in our hospital perhaps as at other clinics. On several occasions several methods have been combined.

As a general rule a general anæsthetic was employed for these cases. This consisted usually of nitrous oxide gas followed by ether and in rare instances by chloroform or of ether or chloroform alone. A few of the surgeons following the custom in use abroad especially in Germany employed local anesthesia and it was found perfectly feasible to do even extensive thoracoplasties in this way.

For those who were in poor condition either from the continued suppuration or as a result of some intercurrent or complicating disease, it was found necessary to do these operations in more than one stage. The extent of operating done at each stage was determined by the condition of the patient at the beginning of the operation and by the manner in which the operative attack was borne. Very extensive thoracoplasties could be made therefore even in those comparatively feeble and in some the added insult of general narcosis was obviated by the use of local anesthesia.

Our results for the simple revisions are as follows:

Total number of cases	40
Cured	63 per cent
Improved	per cent
Not improved	25 per cent
Died	per cent
One patient	

For the thoracoplasties our results are as follows:

Total number of cases	28
Cured	57 per cent
Improved	7 per cent
Not improved	2 per cent
Died	4 per cent

For the methods of Estlander Schede Depage and Fowler and Delorme our results are as follows

Total number of cases	17
Cured	71 per cent
Not improved	24 per cent
Died	5 per cent ¹
One patient	

Upon one of the patients a Schede thoracoplasty combined with pleural dissection after the method of Ransohoff was made. Two patients were cured by having their scapulae implanted into the enormous cavities which were present in their chests.

Statistics are given below from other clinics for comparison.

Of Schede and Estlander operations

Vosswinkel (8)	
Total cases	135
Cured	56 per cent
Improved	0 per cent
Not improved	3 per cent
Died	20 per cent

Bergs (9)	
Total cases	135
Cured	56 per cent
Improved	18 per cent
Not improved	2 per cent
Died	23 per cent

Of Fowler Delorme operation exclusively

Kurpyuwet (10)	
Total cases	56
Cured	35 per cent
Improved	0 per cent
Not improved	33 per cent
Died	0 per cent

Fowler (11)	
Total cases	1
Cured	37 per cent
Improved	20 per cent
Not improved	30 per cent
Died	per cent

The present tendency seems to be to combine these two general classes of operations and to attack the problem from both sides—from the side of the chest wall and from the side of the pleura. This combined method was advised by Dowd (12) in this country and by Peuckert (13) abroad.

Dissection of the pleura was proposed first in 1906 by Ransohoff (14). In our hospital this operation has never assumed the characteristics of a distinct entity but has rather been made to greater or less degree a part of the other method of operating. The general opinion has been that alone it has little value especially in the bad cases.

Of the eighty-two cases in this series 68 per cent were cured after one or more operations, 7 per cent died. The causes of death were as follows:

	Death
Operative shock	2
Lung abscess	
Cerebrospinal meningitis	1
Tuberculous meningitis	1
Brain abscess	1

Two of these were due directly to the operation. One was due to the primary illness which had induced the empyema and the remainder to complicating disease.

Five of the patients in this series were not operated upon and the final outcome in these is not known. The others were not improved. In twenty cases the cause of the failure to heal was determined. These were as follows:

	Cases
Uncollapsible cavity	9
Tuberculous of sinus or cavity	4
Bronchopulmonary fistula	1
Lung abscess	2
Multiple necrosis of ribs	

One patient went on to develop amyloid viscera and finally died. Practically these are the identical causes which for the most part prevented the healing of the sinus in the very beginning.

For the fifty-six patients who were discharged well there is shown in this table the lengths of time they were kept in the hospital before a cure was effected.

Hospital Stay	Cases
3 weeks	1
4 weeks	15
5 weeks	8
6 weeks	5
7 weeks	4
months	1
3 months	5
4 months	3
5 months	
6 months	1

One was operated upon repeatedly and it was approximately six years before the sinus finally closed.

If we review the causes for the formation of chronic empyema sinuses it is seen that these naturally fall into two groups.

1. The trouble with the mechanical conditions in the thorax which lead to the formation of rigid cavities. These usually result from the formation of adhesion which hold

the lung in an unnatural anatomical relation with the chest wall

2 The empyema results from some primary lesion in the lung usually a lung abscess. Unless this primary condition under goes healing it is found impossible to cause the empyema sinus to close. In time secondary lesions are apt to form such as bronchopulmonary fistula or bronchiectasis these serve to complicate matters and to make the task of healing more difficult if not impossible.

These groups do not include those caused by special infecting organisms such as the tubercle bacillus or actinomycetes. These produce special problems and if we recognize the comparative infrequency with which tuberculosis or actinomycosis affect the pleura with the lesions of empyema it is seen that these are practically negligible.

Excluding and including these then the causes prevalent for the formation of chronic sinuses are almost invariably present at the time the primary incision is made for the drainage of the chest. The longer this condition of affairs is unrecognized and the longer this is allowed to go uncorrected the more difficult does the task become until at a certain stage it becomes an absolute impossibility. The most favorable period for the remedying of these faults is the time when the primary incision is made or as soon thereafter as the condition of the patient allows. It is recognized that a certain number of patients are first seen in such a precarious condition as to forbid any procedure which is not a life saving measure. Frequently thoracotomy or even intercostal incision is dangerous and we have contented ourselves with aspirating the major portion of the pus and allowing the patient to recuperate before doing anything else. A large number of the patients are first seen however in excellent condition and in these it can and should be determined whether the empyema is secondary to the conditions just detailed and an attempt should be made to remedy these when the tissues are soft and pliable and the adhesions and scar tissues have not attained the ironlike strength and density which they so quickly acquire.

RÉSUMÉ

1 In 75 per cent of our patients the cause for the formation of the chronic sinus was present from the very inception of the disease. These can be grouped as follows:

a Fifty two per cent had uncollapsible cavities.

b Seven per cent had lung abscesses or bronchopulmonary fistulae or both of these together.

c Fifteen per cent were tubercular in origin.

2 Excluding the tuberculous cases, which present a special problem—that of the cure of tuberculous infection—60 per cent of the patients owed their chronic sinuses to conditions which were present and were not remedied at the primary operation.

3 The method of operating for acute empyema must permit of a thorough examination of conditions in the chest and the removal or correction of any lesion which tends to the formation of chronic sinuses.

4 The remaining 25 per cent of the patients owed their chronic sinuses to faults in the after treatment which with good care can and should be eliminated.

NOTE. Thanks are due to Dr Alexis A. Moschcowitz for the privilege of making these studies and for many suggestions during the course of preparation of this paper. Thanks are also due to Dr Arpad G. Gerster and to Dr Howard Libenthal of the First and Second Surgical Divisions of Mount Sinai Hospital for the privilege of making use of the histories of these patients.

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NEPHRECTOMY DURING PREGNANCY

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DURING pregnancy the avoidance of major surgery is highly desirable as, at this time the reserve power is freely expended and excessive evacuations are frequently demanded. Moreover the risks of abortion and liability of premature labor are additional militating reasons.

Despite the soundness of the foregoing statement operative intervention during pregnancy is not inevitably injurious nor is the interruption of pregnancy a certain consequence. There exist innumerable records of abdominal operations performed during pregnancy. These include appendectomy, ovariectomy, cholecystostomy and even direct attacks upon the uterus as the enucleation of a fibroid tumor. In many of these cases gestation continued uninterrupted. The author performed a laminectomy for fracture dislocation of the lumbar spine (total paralysis of the lower extremities) on a woman four months pregnant. Notwithstanding the severity of this operation abortion did not occur. This illustrates the apparent immunity of some uteri to abortion.

That the existence of pregnancy enhances the seriousness of nephrectomy cannot be gainsaid. The severity, however, of this conclusion is softened when one recalls the rôle the kidney plays in the modern conception of the pathologic physiology of eclampsia. The present day view inclines to minimize the importance of the kidney in the production of this intoxication and tend to attribute the main error to the liver, thyroid or placenta. Another mitigating factor is the recognition of the capacity of compensatory hypertrophy of the companion organ.

A case in point is the following which occurred in the second surgical division of Fordham Hospital in the service of Dr. William P. Healy through whose courtesy the writer operated on and reports the case.

Mrs. L., age 21. Admitted to hospital January 24, 1913. Family history negative. Personal history a mild attack of measles during childhood.

No similar attacks. Menstruation began at four teen and has always been regular and painless. The patient has been married ten months, and the last menstruation occurred four months ago.

The present illness began ten days ago when an alveolar abscess from which she had suffered for a short time ruptured spontaneously. Two days ago she experienced a severe pain in the lower back. The following day a chill took place. Since then the pain has increased daily in severity and yesterday became general radiating across the abdomen localizing finally in the right lumbar region and the right side of abdomen. The temperature has been high—several times 104° F. was attained. The pain increased on motion. No disturbance of urination constipation.

Physical examination reveals a well developed and well nourished young woman. The pupils are equal and react to light. The mucous membranes are of a good color. The heart is sound. Examination of the lungs is negative.

Abdominal palpation discloses an indefinite area of resistance in the right abdominal zone. Tenderness is extreme and can be readily elicited in the right costovertebral angle. Bimanual pelvic examination shows the uterus extending almost to the umbilicus. The cervix is softened and admits the tip of one finger.

Urinalysis. The color is reddish. Specific gravity 1.030. A moderate amount of albumin, white blood cells and many finely granular and large hyaline casts. The white blood-cell count is 34,800 with 88 per cent of polymorphonuclears.

The differential diagnosis lay between pyelo-nephritis secondary to puerperal pyelitis and unilateral hematogenous infection of the kidney. The latter condition was suspected owing to the onset immediately following the alveolar abscess. Owing to the apparent grave septic condition of the patient an immediate operation was decided upon.

Operation. (Dr. A. H. Harrigan.) Ether narcosis. A right lumbar incision was made parallel to and one inch from the last rib. This was deepened through the skin, fascia and muscle planes. After separating delicate perinephritic adhesions the kidney was delivered. The perirenal tissues were infiltrated and friable. The surface of the kidney presented innumerable yellow nodules or foci ranging in size from that of a pin head to ten times that size. The macroscopic appearance confirmed the diagnosis of multiple septic infarcts of the kidney and nephrectomy was decided upon. The vascular pedicle and the ureter were clamped and the kidney was removed. The renal vessels were doubly ligated with chromic catgut and the ureter tied off separately. Some serous ooing persisted which was controlled

with gauze packing. The wound was closed in layers up to the point of emergence of the drain. Dry dressings were applied.

The recovery was uneventful. The patient did not abort and no signs of kidney insufficiency presented. During the first twenty-four hours following operation 26 ounces of urine were collected. On the second day 40 ounces and from then on until the day of the patient's discharge the daily output was over 40 ounces a day. The temperature came to normal following operation. The patient was discharged February 6, 1913, in excellent condition. The wound was closed save for a short sinus in the upper angle.

About the middle of May 1913 the patient became restless, irritable and complained of insomnia. Slight jaundice was present and an increase in albuminuria. Dr. William Hinz, the patient's physician, fearing the development of a toxæmia induced labor at a time corresponding to the end of the seven and one-half months. A healthy and well-developed child was born within 24 hours. The puerperium was uneventful.

At the end of two years Dr. Hinz reports that the patient is in excellent health and suffers no inconvenience from the loss of the kidney.

Bacteriological report. A culture taken at the operation from one of the foci showed a pure growth of staphylococcus.

Pathological report (Dr. Charles Z. Garside, Pathologist to Fordham Hospital). The tissue was fixed in Orth's solution, washed, run through the graded alcohols and embedded in celloidin and paraffin combined. Sections were stained by Gram's method in hæmatoxylin and eosin and in azure II and eosin.

The most striking features of the section is the appearance of ten to twelve circumscribed dense collections of polymorphonuclear leucocytes. These conglomerations are gathered together in one corner of the section. They tend to fuse but there remain small islands of visible renal parenchyma between individual clusters. This intervening tissue however is profoundly affected; the cells lining the tubules are markedly degenerated; the lumens of the tubules are crowded with dense masses of polymorphs (pus casts); the peritubular vessels are intensely engorged and the intertubular tissue is everywhere infiltrated with reactive cells. The dense swarms of polymorphs forming the circumscribed collections so cloud the field that no identifying features of the underlying tissue can be made out. Each collection shows beginning necrosis and each is more or less sharply delimited by a boundary zone of engorged blood vessels. The patch of individual foci is also enclosed by an encircling meshwork of congested blood vessels which separates it from the surrounding tissue which has escaped the primary infection. Just outside this zone of dilated capillaries is a zone of leucocytic infiltration. The lumens of the tubules included within this area are crowded with polymorphs.

This zone of infiltration gradually merges with the area of kidney tissue not affected by the suppurative process but which is the seat of secondary toxic effects. Within this area the glomeruli are so swollen that the capsular spaces are effaced; the tubular epithelium is found in all stages of degeneration including necrosis and sloughing; the tubular basement membranes are oedematous; there is no apparent increase in the interstitial connective tissue and no generalized increased cellulation.

Diagnosis. Suppurative nephritis.

The term suppurative nephritis has several synonyms. These include acute unilateral hæmatogenous infection of the kidney, focal suppurative nephritis and multiple septic infarcts of the kidney.

The gross specimen is so striking an illustration of this singularly interesting lesion that the macroscopic diagnosis at the operation was simple. As the lesion has been often ascribed to a preexisting single suppurative focus as a furuncle, the inference is fair that the antecedent alveolar abscess had an etiological relationship. Recently the operation of nephrotomy has been advocated as a curative measure in this condition. The intense infections of the kidney in this instance demanded a nephrectomy.

A review of the literature reveals 36 additional cases of nephrectomy during pregnancy. There are numerous case reports of nephrotomy during pregnancy and several excellent monographs relating to the obstetrical future of women previously subjected to nephrectomy. These phases of the subject have not been considered here.

In 31 cases the pathological diagnosis are given as follows:

	Cases
Pyonephrosis	9
Hydronephrosis	5
Tuberculosis	4
Chronic pyelitis	1
Adenoma	2
Cyst	1
Echinococcus	2
Multilocular fibrocystic adenoma	1
Congenital pelvic kidney	1
Interstitial nephritis	1
Persistent fistula secondary to previous nephrotomy	1
Ruptured kidney	1
Perinephric abscess andiliary abscesses of the kidney	1
Secondary hæmorrhage from previous nephrotomy	1

Six authors fail to mention the immediate result. Of the remaining thirty all recovered but two (Lenger Tuffier). Of the twenty-eight patients who recovered the obstetrical outcome is noted in twenty-four cases; twenty went to labor without accident or complications. In the remaining four two aborted spontaneously and in the others abortion was induced. Oppel's case in which abortion occurred spontaneously is excluded in this computation as no mention is made of the operative result.

The cardinal clinical points for insistence are that nephrectomy during pregnancy has a comparatively low mortality; that abortion or premature labor occurs but seldom; and that, as a rule, pregnancy proceeds to term without accident or complication.

Adjoined is a summary of the cases giving more details. Some case reports are inaccessible. Those of MacBurney, Pillet, Nicolich and Prochownick are mentioned by Hartmann in his *Travaux de Chirurgie Anatomique Clinique* vol. iv.

Reference is made by Chevassu to the cases of Fritsch and Oppel in his article in the *Encyclopédie Française d'Urologie*.

SUMMARY OF CASES

CASE 1. Reported by Andrews, J. *Gynec. & Obst. Brit. Emp.* 1909. The patient age 32 was in the fourth month of pregnancy. Operation performed through lumbar route. Pathological diagnosis: Hydronephrosis. The patient recovered from the operation with normal delivery at term.

CASE 2. Reported by Bickle. *Indian Med. Rec.* 1900. The patient age 29 was in the second month of pregnancy. Operation performed through transperitoneal route. Pathological diagnosis: Hydronephrosis. The patient recovered normal delivery at term.

CASE 3. Reported by Braatz. *Deutsche Ztschr. f. Chr.* 1898. The patient was 33 years old. Operation through transperitoneal route. Pathological diagnosis: Chronic interstitial nephritis. The patient recovered.

CASE 4. Reported by Brown. *N. Y. M. J.* 1909. August. The patient age 26 was in the second month of pregnancy. Operation through lumbar route. Pathological diagnosis: Chronic pyelitis. The patient recovered spontaneous abortion nine days following operation.

CASE 5. Reported by Cova, abstracted in German's *Thèse de doct. Par.* The patient age 36 was in the third month of pregnancy. Operated upon through lumbar route. Pathological diagnosis:

Calculus pyonephrosis. The patient recovered normal delivery at term.

CASE 6. Reported by Crapin. *Am. J. Obst.* 1898. The patient age 25 had been pregnant eight and one-half months. Operated upon through the vaginal route. Pathological diagnosis: Congenital pelvic kidney. The patient recovered normal labor.

CASE 7. Reported by Cumston. *N. Y. M. J.* 1902. The patient age 29 was in the fourth month of pregnancy. Operated upon through lumbar route. Pathological diagnosis: Pyonephrosis. The patient recovered normal delivery at seven and one-half months.

CASE 8. Reported by Fritsch, mentioned in *Encyclopédie Française d'Urologie* vol. ii. The patient had been pregnant seven months. Operated upon through the lumbar route. Pathological diagnosis: Perinephritic abscess and miliar abscesses of kidney. The patient recovered spontaneous abortion on same day of operation.

CASE 9. Reported by Gerster. *N. Y. med. Monatschr.* 1897. The patient was in the sixth month of pregnancy. Operation through the lumbar route. Pathological diagnosis: Echinococcus cyst. The patient recovered abortion induced one month later.

CASE 10. Reported by Helfferich, abstracted in German's *Thèse de doct. Par.* The patient was in the fifth month of pregnancy. Pathological diagnosis: Pyonephrosis. The patient recovered normal labor at term.

CASE 11. Reported by Hartmann. *Travaux de Chirurgie Anatomique Clinique* vol. iv. The patient age 34 was in the second month of pregnancy. Operation through lumbar route. Pathological diagnosis: Pyonephrosis. The patient recovered normal labor at term.

CASE 12. Reported by Hartmann. *Travaux de Chirurgie Anatomique Clinique* vol. iv. The patient age 33 was in the fifth month of pregnancy. Operation through lumbar route. Pathological diagnosis: Tuberculosis. The patient recovered normal labor at term.

CASE 13. Reported by Israel. The patient age 20 was in the fourth month of pregnancy. Operated upon through lumbar route. Pathological diagnosis: Tuberculosis. The patient recovered normal labor at term.

CASE 14. Reported by Jarman. *Tr. N. Y. Obst. Soc. May* 1900. The patient age 31 was in the fifth month of pregnancy. Operation through lumbar route. Pathological diagnosis: Pyonephrosis. The patient recovered normal labor at term.

CASE 15. Reported by Kosinik, abstracted in German's *Thèse de doct. Par.* The patient was in the fourth month of pregnancy, recovered from operation, normal labor at term.

CASE 16. Reported by Kroenlein. *Verhandl. d. deutschen Gesellschaft f. Chr.*, 28th Cong. The patient age 38 was in the third month of preg-

nancy Pathological diagnosis Multilocular fibro-cysto adenoma The patient recovered

CASE 17 Reported by Landau Deutsche med Wchn chr The patient was in the ninth month of pregnancy Pathological diagnosis Calculous Pyonephrosis Recovery

CASE 18 Reported by Legueu LePage and Couvelure Bull Soc obst et gynec Par May 1904 The patient age 27 was in the third month of pregnancy Operation through lumbar route Pathological diagnosis Persistent fistula resulting from previous nephrotomy The patient recovered normal labor at term

CASE 19 Reported by Lenger Presse méd 1896 607 The patient age 9 was in the sixth month of pregnancy Operation through transperitoneal route Pathological diagnosis Hydro-nephrosis The patient died from eclampsia

CASE 20 Reported by Lohmer Inaugural Dissertation Greifswald 1898 The patient age 37 was in the fifth month of pregnancy Operation through lumbar route Pathological diagnosis Pyonephrosis Recovery normal labor at term

CASE 21 Reported by Lynch Surg Gynec & Obst The patient age 35 was in the second month of pregnancy Operation through lumbar route Pathological diagnosis Hemorrhage following nephrotomy for calculus The patient recovered normal labor at term

CASE 22 Reported by Mart n Ztschr f Geburtsh u Gynäk 1899 xviii Pathological diagnosis Hydronephrosis

CASE 23 Reported by Mirabeau Arch f Gynäk 1907 The patient age 34 was in the fifth month of pregnancy Operation through lumbar route Pathological diagnosis Tuberculosis The patient recovered normal labor at term

CASE 24 Reported by MacBurney

CASE 25 Reported by Nicholich

CASE 26 Reported by Oppel The patient was in the seventh month of pregnancy Pathological diagnosis Pyonephrosis Spontaneous abortion the same day as operation

CASE 27 Reported by Parkes Am J M Sc 1900 Patient age 26 was in the seventh month of pregnancy Operation through transperitoneal route Pathological diagnosis Adenoma The patient recovered normal labor at term

CASE 28 Reported by Pillet

CASE 29 Reported by Pilz Zentralbl f Gynäk 1905 The patient age 27 was in the fourth month of pregnancy Operation through lumbar route Pathological diagnosis Tuberculosis The patient recovered normal labor at term

CASE 30 Reported by Polk Am J Gynec & Obst 1898 164 The patient was 35 years old Operated upon through lumbar route Pathological diagnosis Cyst The patient recovered normal labor at term

CASE 31 Reported by Prochownich

CASE 32 Reported by Rudolph Inaugural Dissertation Greifswald 1898 Operated upon through lumbar route Pathological diagnosis Pyonephrosis The patient recovered

CASE 33 Reported by Scudder Am J M Sc 1895 The patient age 19 was in the third month of pregnancy Operated upon through lumbar route Pathological diagnosis Cystic adenoma The patient recovered normal labor at term

CASE 34 Reported by Tuffier Ann d mal d org génito urin Par 1892 Patient age 30 was in third month of pregnancy Operated upon through lumbar route Pathological diagnosis Ruptured kidney Death from embolism

CASE 35 Reported by Twynam Brit M J Lond 1898 Patient age 32 operated upon through lumbar route Pathological diagnosis Cyst The patient recovered abortion and died 27 days later

CASE 36 Reported by Waechalen Inaugural Dissertation Halle 1900 The patient age 28, was in the fourth month of pregnancy Operated upon through transperitoneal route Pathological diagnosis Hydronephrosis The patient recovered normal labor at term

THE REPAIR OF FRACTURES

AN EXPERIMENTAL STUDY¹—ONE TO SIX WEEKS

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EITHER the present teaching regarding the formation of callus particularly the early or so called provisional callus is wrong or the experiments of Macewen, Moore and Corbet, MacWilliams and our own are all wrong. Our experimental findings have led us with others to conclude that the periosteum is not an osteogenetic agent. When one has seen defects in bone which were made with a trephine heal although the periosteum had been entirely removed and when one has seen fractures heal in the absence of periosteum, there seems to be only one conclusion that the periosteum plays no active part in callus formation.

The artistic view as is illustrated by a drawing taken from Keen and very recently expressed by Phemister² is incorrect. We believe Phemister states. The periosteal callus forms almost entirely by a proliferation of the inner or cambium layer of the periosteum. Wilensky (1914) states. The effectiveness and rapidity of repair will depend to the largest extent on the condition of the periosteum. Theodor Guembel (1906) is of the opinion that the periosteal as well as the marrow callus arises from the same tissue, namely the osteogenetic layer of the periosteum. Pochhammer (1910) is of the opinion that callus is traceable to the proliferative activity of periosteal or myelogenous osteoblasts.

Few have had the opportunity to study human callus in the recent state and no one has been able to follow the successive stages of its formation. Orth has studied a 15 day callus formation in a man of 80 and a 38-day callus in another case. In both instances he

demonstrated cartilage in the callus. Flourens, Mars and others have reported cartilage formation as a preceding stage in the development of human callus.

The experiments on which this paper is based were performed on dogs. The fibula was selected as the experimental bone because of the difficulty we had in immobilizing any of the long bones which were unsupported by a natural splint. In order that we might compare results accurately the fibulae of both legs were fractured. On one side we would remove periosteum from the shaft of the fibula for a distance of one-half inch on either side of the fracture and on the opposite leg the fracture was made through the periosteum. The following table summarizes the experiments.

Experiment	Duration, days	Age of Animal	Periosteum removed	Periosteum removed	Macroscopic Result
1	2	Young	Left	Right	Non union, no callus
2	2	Young	Left	Right	Non union, no callus
3	2	Adult	Left	Right	Non union, no callus
4	2	Adult	Left	Right	Non union, no callus
5	2	Young	Left	Right	Organization, lot
6	2	Young	Left	Right	Organization, lot
7	2	Adult	Left	Right	Some callus above and below site of fracture
8	2	Adult	Left	Right	Infected — not preserved
9	2	Adult	Left	Right	Non-union
10	2	Adult	Left	Right	Hard mass surrounding seat of fracture, no bony union
11	2	Adult	Left	Right	Nodules mass over location of previous fracture, no bony union
12	2	Pup	Left	Right	Some callus, slight motion, seat of fracture
13	2	Pup	Left	Right	Marked ring of callus, Good union
14	2	Young	Left	Right	Firm union
15	2	Young	Left	Right	Firm union
16	2	Adult	Left	Right	Union perfect, large mass of callus
17	2	Adult	Left	Right	Union perfect, large mass of callus

From the macroscopic and X-ray appearances in these cases it would seem justifiable to conclude that the callus formed had appeared as early without as with periosteum.

Knowing how firmly rooted is the opinion that periosteum is a factor in callus formation and realizing that some may ask the question whether *all* of the periosteum was removed one of us (Mann) has made a histologic study of all of our preparations. A résumé of this study is full of interesting facts.

In an eight-day fracture (Experiment 12L) the cortical layers of the old bone proliferate by throwing out new bony trabeculae in every way analogous to rapidly developing embryonic bone. At the place of the fracture thus rapidly proliferating bone undergoes a chemical change leading to cartilage formation which later forms the link between the fractured ends of the bone forming cartilaginous callus. The periosteal tissue stretches over the break sending only a few fibers into the atrophic looking cartilaginous cup.

In a fourteen day fracture with periosteum removed the cortical layers of the fibula and the adjacent tibia show active growth with the formation of new trabeculae and the transformation of bone-cells into cartilage. That the latter is not formed from the periosteum is proved by the fact that the rapidly re-formed periosteum has formed a dense capsule around the cartilage compressing the peripheral cartilage-cells. Further it is noted that organizing fibrin clot and fibrous cartilage are taking an active part in callus formation at this stage. The periosteum still shows no evidence of giving rise to either cartilage or bone.

In an eighteen-day fracture plus periosteum the callus formed was found to have been derived entirely from osseous tissue. Callus at this stage is cartilaginous in character and is markedly avascular. Here again it is noted that the smallest cartilage-cells are under the periosteum and are being compressed by it indicating that the growth of cartilage took place from within outward.

After twenty seven days in the absence of periosteum we note only cartilage and cortical bone proliferation giving rise to callus. When periosteum is left for a similar period (Experiment 23L) the periosteum is pushed outward by the growing callus and shows no evidence of proliferation. After 38 days the periosteum still plays no part in callus forma-

tion as there is a sharp differentiation between the periosteum and the cartilage forming the callus. The original dense cartilaginous callus is being eroded by medullary spaces and bone is being deposited on the peripheral parts of this callus. Even at this period the transition between true bone cells and true cartilage-cells may be seen. Some of the large haversian spaces are more or less completely lined with cartilage-cells. The callus formed by cartilage-cells seemed to have pushed the periosteum outward. In a similar 38-day fracture minus periosteum (Experiment 18R) the callus is composed of a great deal of cartilage and connective-tissue trabeculae coming from the old bone. The periosteum compared with Experiment 18L on being replaced has become hypertrophic, but does not seem to take any part in the callus formation.

GENERAL CONCLUSIONS

A study of vigorously growing embryonic bone or bone in which increased activity has been called for by injury shows that bone will respond in two ways. (1) Either by an exceedingly active subperiosteal (nothing to do with the periosteum) proliferation of osteoblasts in consequence of which the new bone is much richer in bone-corpuscles than bone growing more leisurely. This newly formed bone will form a distinct cortical layer and will push the periosteum before it. (2) When as a result of a more severe injury the nutrition has been interfered with, by rupturing the blood vessels of the haversian systems bone-cells adapt themselves to the new conditions by undergoing a chemical change in consequence of which they gradually become converted into cartilage. The latter having acted for a time as a bond of union between the two adjacent fractured ends of bone will in the end be invaded by an extension of medullary spaces. This cartilage also serves as a scaffold for the deposit of true bone on its surface. In some instances the proliferation of the osteogenous cartilage is so vigorous as to invade the haversian systems, in which case these canals will be lined by cartilage. The periosteum seems to react only in some cases by proliferating vigorously and becomes included passively as Sharpey's fibers by the

enveloping bone. The fate of the fibrin blood clot during the early days we hope to study by a series of new experiments from one to seven days.

From a clinical viewpoint the main result of our investigation is that even without

periosteum a very firm union of bone may be obtained a phenomenon readily explained on the assumption that the union is brought about by special modification of the bone itself and is not due to any activity on the part of the periosteum.

HISTOLOGICAL INTERPRETATION OF ILLUSTRATIONS

By PROFESSOR GUSTAV MANN

EXPERIMENT 38R

Fig 1. Fracture. No periosteum—14 days. Fragments overriding. 1. Shaft of old bone. 2. Cap of connective tissue covering free ends of bone. This connective tissue must have been derived by actively proliferating new periosteum. At 3 notwithstanding the removal of the periosteum there has been formed a mass of cellular cartilage. There is very little indication of a fibrous matrix. The demarcation between this cartilage and the proliferated new periosteum 4 is quite sharp.

Fig 2. Highly magnified view of former preparation showing 1. cellular cartilage forming a layer over the old bone. 2. 3 is a cleft which has been produced artificially owing to shrinkage. The origin of this cellular cartilage could not be made out as the demarcation between the bone and the periosteum was quite sharp.

EXPERIMENT 39R

Fig 3. Fracture minus periosteum—14 days. 1—2. Old bone. 2. delicate connective tissue continuous with connective tissue over the shafts of fractured bone forming at 2 a pad between the ends of fractured bone. Osteoclasts covering ends of fractured bone. On the left side there is doubtful proliferation of bone. 3a. Transformation of bone

which had proliferated under the periosteum into typical cartilage (metaplasia). 3b. The height of the tibia must have been injured in the process of scraping the fibula because of the same appearance as under 3a. The cells in 3a and 3b are *omphaloid* on the side toward the periosteum. The active growth is therefore away from the periosteum. 4a and 4b. Very delicate connective tissue with numerous blood vessels. The fibers in the center cut across laterally running longitudinal probably derived in part from proliferating periosteal tissue in part from organizing fibrin clot and in part from fibrous cartilage. On the right side of 4b remnant of blood clot. Tendinous insertion to bone well marked at 5. 6. great vascularity over 6. muscle of tibia.

Conclusion. Transformation of bone into cartilage on periphery but not from end!



Fig 1



Fig 2

Knowing how firmly rooted is the opinion that periosteum is a factor in callus formation and realizing that some may ask the question whether *all* of the periosteum was removed one of us (Mann) has made a histologic study of all of our preparations. A résumé of this study is full of interesting facts.

In an eight-day fracture (Experiment 12L) the cortical layers of the old bone proliferate by throwing out new bony trabeculae in every way analogous to rapidly developing embryonic bone. At the place of the fracture this rapidly proliferating bone undergoes a chemical change leading to cartilage formation which later forms the link between the fractured ends of the bone forming cartilaginous callus. The periosteal tissue stretches over the break sending only a few fibers into the atrophic looking cartilaginous cup.

In a fourteen-day fracture with periosteum removed, the cortical layers of the fibula and the adjacent tibia show active growth with the formation of new trabeculae and the transformation of bone-cells into cartilage. That the latter is not formed from the periosteum is proved by the fact that the rapidly re-formed periosteum has formed a dense capsule around the cartilage compressing the peripheral cartilage-cells. Further it is noted that organizing fibrin clot and fibrous cartilage are taking an active part in callus formation at this stage. The periosteum still shows no evidence of giving rise to either cartilage or bone.

In an eighteen day fracture plus periosteum the callus formed was found to have been derived entirely from osseous tissue. Callus at this stage is cartilaginous in character and is markedly vascular. Here again it is noted that the smallest cartilage cells are under the periosteum and are being compressed by it indicating that the growth of cartilage took place from within outward.

After twenty-seven days in the absence of periosteum we note only cartilage and cortical bone proliferation giving rise to callus. When periosteum is left for a similar period (Experiment 23L) the periosteum is pushed outward by the growing callus and shows no evidence of proliferation. After 38 days the periosteum still plays no part in callus forma-

tion as there is a sharp differentiation between the periosteum and the cartilage forming the callus. The original dense cartilaginous callus is being eroded by medullary spaces and bone is being deposited on the peripheral parts of this callus. Even at this period the transition between true bone-cells and true cartilage-cells may be seen. Some of the large haversian spaces are more or less completely lined with cartilage-cells. The callus formed by cartilage-cells seemed to have pushed the periosteum outward. In a similar 38-day fracture minus periosteum (Experiment 18R) the callus is composed of a great deal of cartilage and connective-tissue trabeculae coming from the old bone. The periosteum compared with Experiment 18L on being replaced has become hypertrophic, but does not seem to take any part in the callus formation.

GENERAL CONCLUSIONS

A study of vigorously growing embryonic bone or bone in which increased activity has been called for by injury shows that bone will respond in two ways (1) Either by an exceedingly active subperiosteal (nothing to do with the periosteum) proliferation of osteoblasts in consequence of which the new bone is much richer in bone-corpuscles than bone growing more leisurely. This newly formed bone will form a distinct cortical layer and will push the periosteum before it. (2) When as a result of a more severe injury the nutrition has been interfered with by rupturing the blood vessels of the haversian systems bone-cells adapt themselves to the new conditions by undergoing a chemical change in consequence of which they gradually become converted into cartilage. The latter having acted for a time as a bond of union between the two adjacent fractured ends of bone will in the end be invaded by an extension of medullary spaces. This cartilage also serves as a scaffold for the deposit of true bone on its surface. In some instances the proliferation of the osteogenous cartilage is so vigorous as to invade the haversian systems, in which case these canals will be lined by cartilage. The periosteum seems to react only in some cases by proliferating vigorously and becomes included passively as Sharpey's fibers by the

enveloping bone. The fate of the fibrin blood clot during the early days we hope to study by a series of new experiments from one to seven days.

From a clinical viewpoint the main result of our investigation is that even without

periosteum a very firm union of bone may be obtained a phenomenon readily explained in the assumption that the union is brought about by special modification of the bone itself and is not due to any activity on the part of the periosteum.

HISTOLOGICAL INTERPRETATION OF ILLUSTRATIONS

B. PROFESSOR GUSTAV MANN

EXPERIMENT 18R

Fig 1. Fracture. No periosteum—14 days. Fragments overriding. 1. Shaft of old bone. 2. Cap of connective tissue covering free ends of bone. This connective tissue must have been derived by actively proliferating new periosteum. At 3 notwithstanding the removal of the periosteum there has been formed a mass of cellular cartilage. There is very little indication of a fibrous matrix. The demarcation between this cartilage and the proliferated new periosteum 4 is quite sharp.

Fig 2. Highly magnified view of former preparation showing cellular cartilage forming a layer over the old bone. 2, 3 is a cleft which has been produced artificially owing to shrinkage. The origin of this cellular cartilage could not be made out as the demarcation between the bone and the periosteum was quite sharp.

EXPERIMENT 19R

Fig 1. Fracture minus periosteum—14 days. 1—1. Old bone. 2 delicate connective tissue continuous with connective tissue over the shafts of fractured bone forming at 2 a pit between the end of fractured bone. Osteoclasts covering end of fractured bone. On the left side there is doubtful proliferation of bone. 3a Transformation of bone

which had proliferated under the periosteum into typical cartilage (metaplasia). 3b. The hitherto the tibia must have been injured in the process of scraping the tibia because of the appearance under 3a. The cell in 3a and 3b are metaplastic on the side toward the periosteum. The growth is therefore away from the periosteum. 4a and 4b. Very delicate connective tissue with numerous blood vessels. The fibers in the center cut across laterally running along a line of proliferation in part from proliferating periosteal tissue in part from organizing fibrin clot and in part from fibrous cartilage. On the right side of 4b remnants of blood clot. 5. Tenuous invasion of bone well marked at 5, 6 great vascularity over 6 muscle of tibia.

Conclusion. Transformation of bone into cartilage on periphery but not from end.



1a



1b



Fig 3

EXPERIMENT 10L

Fig 4 18 day fracture plus periosteum The figures represent a tangential section midway between the medullary canal and the periphery of the bone 1 Represents the periosteum which is shown better in the next figure 2 Is the old bone 3 Transformation of bone into cartilage

Fig 5 More highly magnified (Fig 4) shows the periosteum denser and more fibrous in its outer layer 1 more delicate in its inner layer 2 next to the bone. Owing to the irritation caused by the fracture of the old bone 3 is being changed in the deeper layers into cartilage 6 (see also Fig 7). At the fracture the bone has become much more cellular by the proliferation of bone corpuscles of the old bone. Here delicate bony trabeculae are seen to radiate into the inner layer of the periosteum. These trabeculae are covered with osteoblasts. The



Fig 5



Fig 4

appearance presented by this section is very similar to the appearance presented by actively growing bone as can be readily seen by comparing this figure with that of an actively growing ethmoidal bone in a newly born kitten

Fig 6 Cat's jaw 1 and 2 Periosteal layers 3 Junction of periosteum and outer surface of bone 4 osteoblasts attached to the bone and not to the periosteum 5 bone with osteoclasts which have become included to form bone corpuscles 6 perichondrosteal membrane common to both the bone and adjacent cartilage 7 cartilage

Fig 7 18 day fracture plus periosteum (high power) The haversian spaces and canals of the old bone 2 have become filled by hyaline cartilage 1 with a very well developed fibrous matrix. This

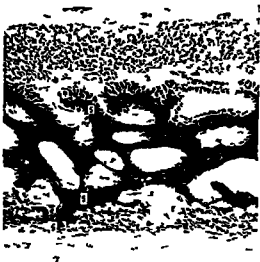
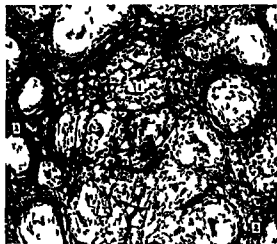


Fig 6



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cartilage seems to be derived by a transformation of those osteoblasts of the old bone which were lying nearest to the haversian spaces

EXPERIMENT 23L

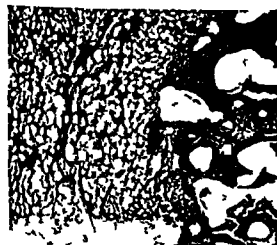
Fig 8 7 day fracture plus periosteum The two fragments of the old bone are knit together by a pad which consists of a ring of hyaline cartilage abutting at its periphery on periosteum sharply defined on its central surface where it rests on a core of fibrous tissue derived for the most part from the proliferating osteoblasts (see Fig 11)

The figure shows distinctly that there is no proliferation of the periosteum as one would expect if the periosteum were the active agent. The very opposite namely the distinct thinning of the peri-



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osteum where it has been pushed outward can be seen. The ring of hyaline fibrocartilage shows that those of its cells which lie immediately under the periosteum are compressed by the periosteum in this respect resembling the cartilage cells which lie next to the joint cavity while the cartilage cells nearer the center of the medulla are much larger and better formed—as one sees them at the line of proliferation at the junction of the epiphysis and diaphysis of a normally growing bone. Here and there a transition between this ring of cartilage and the old bone can be noticed which shows that the cartilage is not periosteal in origin. Shows delicate bony trabeculae with the center of each trabecula stained blue and much richer in cells than the typical bone which stains red. It is



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Fig

is older blue material rich in cells which by differentiation gives rise to cartilage. 3 Fibrous bone formation starting from the red staining bone mentioned under 2 (see Fig 1). 4 On the right side the bony trabeculae are for some reason much more marked than on the left. 5 Periosteum.

Fig 9. 1 The subperiosteal ring of callus formed by cartilage passing gradually into the old bone and sharply defined from the fibrous core. 3 Fig 10. The fibrous core 2 bounded above by alveolar cartilage on the right side by bone giving rise to osseous fibers. It will be noticed that the core is very rich in blood vessels which along with some delicate marrow connective tissue are removed from the medullary spaces.

Fig 1. The ends of the fractured bone are radiating out bundles of fibrous tissue which interlock midway between the fragments of the bone. 2 3 Blood vessels are numerous.



Fig 3

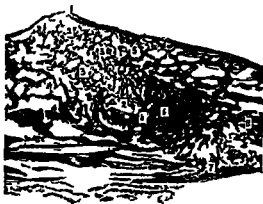


Fig 1

EXPERIMENT 18L

Fig 12. 38 day fracture with periosteum. 1 Periosteum. Both fragments show a great number of osteoclasts between periosteum and bone. Sharp differentiation between cartilage and periosteum between 1 and 2. 3 Indication of periosteum being transformed into cartilage. 2 In center cartilage trabeculae arranged around bony spaces with no bone deposit. The spaces represent an extension of medullary spaces. 3 Ditto plus bone deposit. 4 Apparent transition between bone and cartilage. 5 On the dorsal half many of the larger haversian spaces are lined more or less completely with cartilage cells. 6 Old bone. 7 Ordinary periosteal fibers growing into haversian spaces. Sharp demarcation of periosteum from cartilage. 8 Old bone. The bone farthest away from the haversian canals, i.e. the oldest bone stains blue with methyl blue showing a chemical difference between



Fig 4

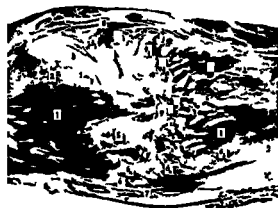


Fig 13

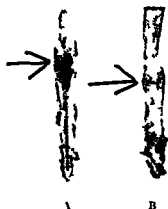
this older and the younger bone lining the haversian canal and spaces. The younger bone stains red the older blue bone gives rise to the cartilage. Growth of cartilage has pushed periosteum outward.

Fig 13 High power view of previous section representing the region just above the upper number 3 showing that bone 1 is going toward the periosteum and not down from the periosteum. 1 Periosteum. 2 Newly formed bone which in the more deeply lying zone has been deposited on cartilage. 3

Fig 14 1 The original bone passes over into cartilage (Fig 1) and gives rise to fibrous bone formation at 3. Fully formed cartilage is seen at 4 and this cartilage is becoming encrusted by new bone. The picture in this respect resembles the typical replacement of cartilaginous trabeculae by bone trabeculae in a normally growing bone.

EXPERIMENT 18R

Fig 15 38 day fracture with periosteum. 1 Old bone. 2 Very active bone deposit on cartilaginous trabecula. 3a cartilage plus deposit of bone. 3b pure cartilage. Where 3a joins 3b the appearance resembles that seen at the extremity of the di-



A Fracture 38 days periosteum intact B Fracture 38 days periosteum removed

aphysis. 3c Transition between cartilage and connective tissue. 4a osteoblasts embedded in dense white fibrous tissue. 4b osseous fibrils derived from bone cut across. 4c fibrous tissue resembling periosteum between it and 1 are osteoclasts. 5 coarse osseous fibrils radiating from the bone. 6a osseous connective tissue. 6b bone. 7 dense white fibrous tissue of periosteum. 8a osseous tissue merging on the right into cartilage then bone. 8b dense white fibrous tissue looking like osseous connective tissue. 9a coarse osseous fibril radiating from the bone. 9b bone. 9c cartilage. 9d dense white fibrous tissue resembling periosteum. 9e cartilage. 10 periosteum along upper edges.

The tissues were fixed in Mann's picrorosin formaldehyde fluid. One half of each preparation was taken through the paraffin process, one half has been set aside for the celloidin process. The account in this paper is based on those taken through the paraffin process. The sections were fixed to the slide by Mann's albumin method and were stained by Mann's short and long methyl blue eosin methods.

Mann Physiological Histology 1907

Ibid p. 37

Ibid p. 6

RECONSTRUCTION AND REPAIR OF ABDOMINAL ORGANS WITH INTESTINAL GRAFTING¹

By A. L. SORESI, M.D., NEW YORK

UP to the present time surgery of the abdominal organs has been very destructive practically all the organs which cause trouble of some sort are either removed or their function is impaired or destroyed altogether.

The successes obtained by modern abdominal surgery might make the presentation of the new view of abdominal surgery outlined in this paper look quite pretentious however every surgeon of large experience feels that there are still a great number of patients who are not benefited at all by surgical procedures and still a greater number who are not benefited as we wish them to be facts which encourage the writer to believe that his work which has been continued for about three years, will prove useful.

The fundamental idea of this work was a systematic study to learn under what conditions it is possible to graft a piece of small intestine so that a reconstructive instead of a demolishing operation might be done by reconstructing or repairing the abdominal organs in such a manner that after the oper-

ation they retain their anatomical form and physiological function as close to normal conditions as possible. This is accomplished by taking advantage of the condition of the small intestine which on account of its length motility and good blood supply lends itself very successfully to such use.

The usual procedure is to resect a piece of small intestine from the most accessible portion and of suitable size leaving it attached to the root of the mesentery by its own blood vessels and graft it wherever it is necessary according to indications following the special technique for each procedure as well as good general surgical technique in making the graft.

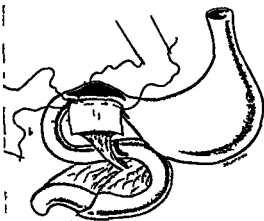


Fig. 1. Schematic view of reconstruction of pylorus showing anastomosis (a) here graft (g) is attached to b grafting secured in place with serous suture (c) in position of pylorus.

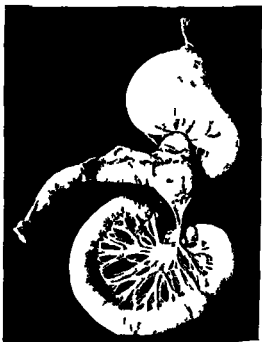


Fig. 2. Photograph of reconstruction of pylorus showing piece of intestine grafted over the pylorus and attached by the blood vessel (a) anastomosis where grafting was obtained. This specimen obtained from dog 6 months after operation which is the best of health.

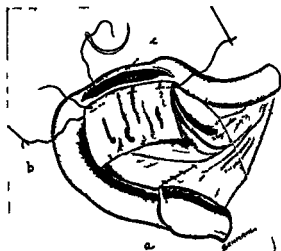


Fig 3 Schematic view of patch in the duodenum anastomosis showing where graft is obtained by grafting in place secured with a sero-serous suture in position over duodenum

The writer will limit himself to report briefly in this paper the work which has proved successful beyond doubt and of practical clinical importance, namely:

- I Reconstruction of the pylorus
- II Patching up defects of stomach and intestine

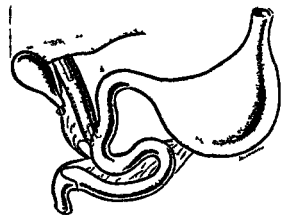


Fig 5 Schematic view of reconstruction of the common duct anastomosis by grafting place attached to its mesentery. This illustration shows the stump of the duct entering the duodenum being the lumen of the grafting tube to be interpreted as schematic view of the procedure in fact the stump not put with the lumen of the grafting the implication of which the duodenum takes place at some distance from the entrance of the common duct into the same



Fig 4 Photograph of a patch over duodenum showing the patch, a specimen obtained 9 months after operation

III Reconstruction of the common biliary duct

IV Reestablishing the continuity of any portion of the colon after extensive resections of portions of the same

The details of technique of each procedure have to be omitted for the sake of brevity and will form the subjects of separate papers to be published later

I RECONSTRUCTION OF THE PYLORUS

When stenosis of the pylorus prevents the passage of food from the stomach into the duodenum the procedures resorted to at the present time are either gastro-enterostomy so creating a new passage aside from

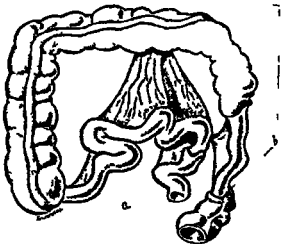


Fig 6 Schematic view of reestablishing the continuity of the colon, anastomosis of small intestine where grafting is obtained by piece of small intestine grafted into the colon



Fig. 7. Photograph of the whole colon of dog 8 months after operation showing anastomosis between cecum and distal part of the graft. *a*, anastomosis between transverse colon and distal part of the graft; *b*, anastomosis between rectum and uterus. In this female dog more than half of the colon was resected and reconstructed with a piece of small intestine. The dog remained the best of health.

the anatomical one or some kind of pyloric anastomosis.

These procedures have not always given satisfactory results, especially in children. The author's idea is to reconstruct the pylorus by putting a large patch over the stenosed area and so obtain a large passage between the stomach and the duodenum. This is accomplished in the following manner: A piece of ileum about 3 cm. long is removed from the rest of the intestine. With a seroserosal suture close to the attachment of the mesentery on the side that naturally comes in contact with the pylorus without twisting the pedicle it is secured over the pylorus half on the stomach and the other half on the duodenum. It is then cut longitudinally about 2 mm. from the suture line so that it becomes a large square piece opening itself and showing the mucosa. The stomach and duodenum are also cut longitudinally parallel with the seroserosal suture line leaving a margin of about 2 mm. as was done for the intestine. This incision is started from the duodenum and must be about 6 or 8 mm. longer than the length of the seroserosal suture extending therefore 3 or 4



Fig. 8. Photograph of part of colon reconstructed showing anastomosis between the cecum and the stump of small intestine after the graft obtained the grafting. *a*, anastomosis between the graft and the upper part of the colon; *c*, anastomosis between the grafting and the rectum; *d*, rectum; *e*, bladder showing on one side. Specimen obtained 8 months after operation. The dog was in the best of health when sacrificed.

mm. on the stomach and the duodenum. A through and through suture with catgut No. 0 is started alongside of the seroserosal and continued all around until the opening made in the stomach and the duodenum is closed. This suture done rapidly will check all the bleeding. The seroserosal suture is then continued all around and the procedure is completed. It is evident that between the stomach and the duodenum there is now a large passage lined with perfect mucosa so large that possible contractions would not affect the easy passage of the contents of the stomach into the duodenum (See Fig. 1 and 2).

This procedure has been performed always with the most satisfactory results—not a single death out of 18 operations resulting from the same—and we feel confident that it will completely supersede gastro-enterostomy or pylorotomy in benign stenosis of the pylorus and might be used in gastric and duodenal ulcers instead of gastro-enterostomy.

II PATCHING UP DEFECTS OF STOMACH AND INTESTINE

Where there is a stenosis and resection is not feasible on account of possible difficulty in making a good anastomosis afterward where large ulcers or other pathological conditions make dissection of some tissue necessary and where for any reason it is not possible to close the gap patching with a piece of small intestine as done in the remaking of the pylorus has always proved successful. At times it is not possible to put two rows of sutures as in the remaking of the pylorus. When it is not possible to make two rows of sutures, it is necessary to put a mattress suture in the serosa taking the stitches as far as possible from the cut edge of the portion of the stomach or intestine to be repaired and to see that all the mucosa is well inverted the line of suture kept well taut showing nothing but serosa. In these cases leakage occurred but once in eleven repairs. Even if leakage had occurred more frequently the procedure should be recommended just the same as all other procedures which have been suggested in such cases have proved to be rather unsatisfactory. (See Figs 3 and 4.)

III. RECONSTRUCTION OF THE COMMON BILIARY DUCT

In case the common duct ceases to permit the free passage of bile the condition of the patient is absolutely desperate and the means which have hitherto been suggested to reconstruct the duct have all met with failure. The technique we have recently used is as follows:

The common duct is reconstructed with a piece of jejunum. This piece of jejunum is passed through the mesocolon and when possible and advisable under the duodenum with a few stitches the serosa of the part that was distal is inverted and stitched close to the base of the liver around the hepatic duct, which is left hanging free in the hollow of the gut. The other end of the intestine is implanted in the duodenum at some distance from the point of entrance of the duct. (See Fig 5.) Of course we have omitted the description of all the preliminary steps that might be necessary such as removing the

gall bladder freeing the duct from adhesions the use of a small rubber tube for the temporary passage of the bile etc. The difficulty met in this work was that the animals used for experimental purpose did not have any pathological condition present and therefore it was impossible to secure the upper portion of the grafting to the liver or any other tissue. To remedy this condition artificial adhesions as found in patients suffering from diseases of the biliary tract were produced and the resulting scar tissue would hold the stitches. We have recently had three successful cases.

The number of failures is still high but we are perfecting the technique. At any rate even if the mortality in these cases were 90 per cent it would still be worth while to save the remaining 10 per cent which are doomed to sure death as the present surgical procedures cannot successfully meet this condition unless the gall bladder can be utilized by anastomosing it with the stomach or the duodenum.

IV REESTABLISHING THE CONTINUITY OF ANY PORTION OF THE COLON AFTER EXTENSIVE RESECTIONS OF THE SAME

When resection of any portion of the colon must be done the problem confronting the surgeon is how to reestablish a safe and comfortable passageway for the elimination of the feces. It is often very dangerous to anastomose the two stumps of the colon and some kind of short circuiting or a permanent artificial anus must be resorted to. It is unnecessary to state that any kind of short circuiting is objectionable and that a permanent artificial anus means permanent invalidism and terrible discomfort.

The colon is reconstructed and its functions preserved by filling the gap left between the two stumps after resection with a piece of small intestine of suitable length. (See Figs 6, 7 and 8.)

In these cases it will be advisable to construct a suitable temporary artificial anus in order to keep the colon free from feces some time before and some time after the operation. The mortality in this procedure was very high at the beginning of our experiments. How

ever with better technique greatly shortening the time of the operation the results are very encouraging and the operation may be said to be of real practical value. The main difficulty we have met in experimenting with dogs is that it is extremely difficult to keep the dogs at rest and death results from embolism or intussusception which cannot be prevented. The procedure in itself has always been perfectly safe since we have adopted the method of anastomosis to be mentioned later leakage never having occurred from any of the three anastomoses which must be performed to accomplish the grafting.

We are now experimenting to extend the graft to the anus that is to resect the large intestine from different points down to the anus. The results obtained so far seem to warrant the hope that even where tumors render necessary the extirpation of the rectum down to the anus it will be possible for the patient to defecate through the natural passage reconstructed from a piece of the small intestine.

In doing this work it was not the aim of the author to show what wonderful feats can occasionally be performed in surgery. His aim is and always has been to find practical procedures to take the place of procedures which do not give the surgeon the satisfaction that he should expect after performing an operation with skill and according to the most rational indications. It has been the aim of the author to develop procedures which would enable the surgeon to operate successfully to relieve conditions for which the present operative treatment is not adequate. The aim has been attained in the four procedures, which have been found of practical value outlined and demonstrated in the photographs illustrating this paper.

Other procedures are still in the experimental stage but we hope that the publication of this paper will stimulate other investigators to broaden still more the field of usefulness of intestinal grafts.

From the beginning of our experiments we felt that in order to make the use of intestinal grafts of real practical clinical value we would have to eliminate all sources of danger

that might be caused by the graft itself or from our technique in obtaining the graft. We found that it was not practical to use pieces of mucosa or isolated pieces of gut since only occasionally such grafts lived, and even in these cases the function of the graft was lost. Therefore we considered it essential that pieces of intestine with the best possible blood supply should be used as grafts and it was possible to secure such grafts by leaving them attached to their own blood vessels. The other source of great danger was to obtain the graft for a piece of small intestine had to be severed and the continuity of the intestine reestablished.

It is easily understood that in order to make grafting of the intestine of real practical clinical value the surgeon must be positive that there is no immediate or future danger to his patient from the anastomosis that is, the anastomosis must be absolutely safe and must not cause stenosis otherwise a condition at times more serious than the one in consideration would result.

The author first used his own method of end to-end anastomosis done over a rubber tube and not being satisfied with the results obtained tried all the methods advised for both end to-end and lateral anastomosis.

All methods of intestinal anastomosis although some of them are excellent for ordinary work were absolutely unsatisfactory for this special work as the tension on the anastomosis was at times too great and leakage or thrombosis would occur. This statement does not mean that all early cases were failures. It means that the failures were too numerous to justify in the mind of the writer even the simple presentation of some successes.

The first step therefore toward making these procedures safe was to devise a method of intestinal anastomosis that was absolutely safe and by safe we mean that we should never fear any danger from our anastomosis. We were fortunate enough to devise such a method which is a happy medium between the end to-end and lateral anastomosis and which was published in the February 1915 issue of SURGERY GYNECOLOGY AND OBSTETRICS.

Although we feel now that the use of intestinal grafts in abdominal surgery is as safe as any other ordinary major operation we want to emphasize that these operations will only be safe in the hand of operators whose technique is absolutely perfect and who

have mastered the new procedure of anastomosis which must be done well and rapidly. These operations should not be performed by the surgeon of so-called average ability but only by those who are masters of all the details of perfect abdominal technique.

TEAM-WORK¹

By B. B. DAVIS, M.D., I.A.C.S., OMAHA, NEBRASKA

In the modern evolution of surgery conditions have so changed that the methods of work practiced a few years ago must be modified to fit in with recent developments. It is now found impossible for a man in any branch of the profession to work alone as he once did. So much more can be accomplished when several men join forces that the solitary worker is likely to be lost or at least fail to score.

The surgeon ought to know a great deal about anatomy, physiology, chemistry, pathology, bacteriology, physical diagnosis, roentgenology, and be an accomplished physician and a man of almost superhuman judgment. But the man who expects to live only seventy years cannot hope to attain commanding efficiency in all these branches and he finds it necessary to call to his assistance those who are experts in their special fields.

A simple case often needs contributions from practically every department of medical knowledge before a thoroughly comprehensive diagnosis can be worked out.

Suppose that Dr. A. prefers to work alone. He examines his case physically in such a way as to include every organ, makes his own blood examination, chemical analyses of the gastric contents, feces and urine, bacterial analyses of the several secretions, a neurological examination, an x-ray and ophthalmological examination, does the required operation himself and makes the needful pathological examination of the tissue removed. If he can do all these things and do them well, I take off my hat to him, but question his wisdom.

Working in such a way he could not adequately dispose of more than two or three cases a week, and if a case was urgent might fail to reach a definite conclusion until after the patient had ceased to need his services. His experience in each of the expert steps would be so limited that he could not attain the efficiency of the man who contents himself to cover a narrower field.

The man who makes twenty blood counts to his one or twenty urinary or gastric analyses or examines twenty hearts and lungs or inspects the fundus of twenty eyes or makes and interprets twenty x-ray plates or studies the bacteria of twenty cases or studies the gross and microscopical pathology of twenty specimens or performs twenty similar surgical operations is bound to be more efficient. The specialist's judgment in his own work cannot fail to be more valuable than the judgment of the man who tries to cover the entire field.

Mr. B. is much wiser and more efficient by perfecting himself in one line and getting his information with reference to the many special tests from those who have had expert training and wide experience in their respective fields. When he brings all his facts together from these several sources, he is less liable to err in his diagnosis than the man who works alone.

This is what I understand by team work. Each individual member of the team does his and they correct and check up one another.

The chief danger in team work is in not taking a comprehensive view of the case as

a whole after all the isolated facts have been brought together. No surgeon can safely make a final diagnosis in a complicated case until he has assimilated all the findings and subjected them to a rigid and logical analysis. Good team work will permit fewer surprises at the operating table; the mortality from operations will be lowered and the results immediate and remote will be more satisfactory.

STANDARDIZATION OF THE SURGEON

What are the fundamental qualities necessary in a man without which he cannot be come a surgeon?

The young man with surgical ambitions should be clear headed and logical. His mind should be able to think straight and grasp a subject comprehensively; quick in making a decision; able to weigh all the factors in a proposition; distinguishing between essential and non essential; but giving each item its proper perspective. He must have courage of a high order. The timid mind and the faint heart are poor props to lean on when life and death are at stake.

He must have physical and mental energy; have a sound mind free from morbidness; a mind that can be depended on under the most trying circumstances. He must be capable of marshaling all his knowledge on a given subject quickly when it is needed. The slow thinker loses time when time may mean life or death. The slovenly thinker is likely to have essential facts come to him after the operation is over.

One of the prerequisite qualities is sanity. The safe surgeon's wits are never wool gathering but go straight to the point by the most direct route.

The ability to operate skillfully is on a lower level than skill in diagnosis; ability to size up a case in all its bearings; an almost uncanny comprehension of a patient's resisting power; but no surgeon can attain marked success who has not skill with his hands. The manual bungler should never try to be a surgeon.

The would be surgeon should be a man who loves life and has the highest regard for the life of his fellow. He must be willing to do

his utmost for every case entrusted to his care. He must be warm hearted; have wide sympathy; so devoted to his profession that the very idea of graft is repugnant to him.

Clean personal habit, both moral and physical, are not too much to demand. An agreeable personality that begets confidence combined with a cheery, hopeful disposition and backed up by a dogged persistency and a never give-up spirit will be most valuable assets.

Having selected a man whose personal qualities seem fitted to make the raw material for a future surgeon, what training is necessary to insure the best finished product? What minimum requirements should be exacted before a man is permitted to go out and practice surgery? Is the present system which regards the mere possession of an omnibus degree in medicine, surgery, and the allied branches a proof of fitness to practice surgery? Is it fair to the public?

Of late a great deal has been said for and against the standardization of the surgeon. There is a better way to develop a surgeon than to follow the old law of the survival of the fittest. The unfit usually decide finally that they are unfit, but at what a fearful cost! Those who finally succeed are classed with the fit too often reach this goal by a route that has to be paid for by the innocent public.

It seems more humane, more decent and more in keeping with the high aim of surgery that a course of study and work be devised which will fit men for the practice of this high vocation and that those unwilling or unfit to follow the prescribed course be denied the right to practice major surgery. With such a system in operation the layman who entrusts his life or the life of his child to a surgeon will have assurance that the man selected has reasonable qualifications and training for his work.

The working out of the detail of a special preparation for the surgeon will be an arduous task, calling for the best wisdom of our wisest men, but it must be done or our state legislatures will do it for us. Those long engaged in the practice of surgery who have attained undoubted success and who have lofty ideals

are so much better qualified to work out the problem that it behooves them to shoulder the burden

It is not my purpose to do more than make suggestions along general lines. There can be no difference of opinion about the wisdom of the candidate for surgery first being grounded in the fundamentals by completing the work that leads to the degree of Doctor in Medicine conferred by the chartered colleges. The wider the culture preceding the beginning of the work of the medical college the better the average results.

As a next step following the M.D. degree I believe an internship in a hospital where thorough scientific and systematic work is done is of the utmost importance.

After this the most practical training would seem to be a term of years as apprentice and assistant to a surgeon of skill and ability. To share daily with the busy surgeon in working out the cases, developing the diagnoses, deciding which should be operated and which should be treated by other methods, sizing up the operative risks, assisting at the operations and sharing in the after treatment will bring out and develop a young man if he has the stuff in him of which surgeons are made.

After a time the apprentice may be entrusted with minor operations under the eye and guidance of his chief. Little by little it will be safe to drill him in the performance of operations of greater magnitude until imperceptibly he comes into his own with a technique and a matured judgment and without risking lives unnecessarily during the process.

It might be found advantageous for the assistants not to remain with one surgeon during the length of their apprenticeship but to change from one to another in order to gain the benefit of a varied technique and different methods of study of cases and treatment.

The process for finally passing on the fitness of a man to enter into practice as an independent surgeon is another problem to be solved. Shall it consist of a special degree by an authorized university, by special license by the state, shall it emanate from a national board to be established by the general govern-

ment or shall the American College of Surgeons be made by general consent the licensing body? It has seemed to me entirely safe to recognize membership in the College of Surgeons as a badge carrying with it the right to practice surgery.

The manner in which the examination is conducted is of great importance. The test to ascertain the candidate's knowledge is easy. To ascertain if he is a real surgeon, safe and sane, possessed of the requisite technical skill, endowed with the sterling mental and moral qualities which are so important is a more difficult matter. A term of service with a number of different surgeons of standing who shall act as a committee to pass on these points ought to be fair and would minimize the chances for mistakes.

In connection with this subject let it be distinctly understood that the right to do any operation of emergency or to do the usual routine surgery that comes to the hand of any physician is unquestioned. Only the setting one's self up as an expert in surgery is under discussion. The proposals do not seem to me to work any hardships on anyone honestly and conscientiously desiring to fit himself as a surgeon. The chief object of the proposed arrangement is to do away with some grave abuses which we all know exist and it will enable the young man of ability to take a high place in the ranks in less time and by an infinitely more satisfactory road than under the present catch-as-catch-can process.

THE CANCER QUESTION

The gravest question confronting the medical profession today is how best to deal with cancer. So many of the deaths from this disease might be prevented that it seems a criminal thing to fail longer in carrying out an educational campaign which has for its purpose bringing hope to the victim of cancer.

The task will prove a difficult one and will require zeal to carry it on and patience to wait for results. There seems such a widespread feeling that the diagnosis of cancer is equivalent to having a death sentence pronounced that it will require persistent earnest effort to allay the prejudice against operation.

In the past quarter-century while the mor-

tality from tuberculosis typhoid fever cholera yellow fever smallpox appendicitis gall bladder disease diphtheria gastro-intestinal diseases of children etc has been steadily decreasing the mortality from cancer has been increasing

That this increase is real and not fanciful let me quote from the statistics of the state of New York

1887 to 1889	43	0 deaths per 100,000 population
1890 to 1892	48	8 deaths per 100,000 population
1893 to 1895	50	deaths per 100,000 population
1896 to 1898	58	7 deaths per 100,000 population
1899 to 1901	66	0 deaths per 100,000 population
1902 to 1904	69	4 deaths per 100,000 population
1905 to 1907	75	deaths per 100,000 population
1908 to 1910	79	1 deaths per 100,000 population
1911 to 1913	86	5 deaths per 100,000 population

Thus in the twenty seven years from 1887 to 1913 inclusive the death rate from cancer has more than doubled. This is about the rate of increase for the United States as a whole

In part an explanation of this apparently alarming increase is that diagnosis is much more positive now than a quarter of a century ago. According to some records recently published of findings in the Berlin hospitals, 20 per cent of the deaths from cancer found at autopsies are unrecognized clinically

It is proper to concede that a part of the apparent increase in cancer is due to better diagnosis but I believe this is only one-half the explanation and that there is a real increase. I do not mean to assert that the tendency for cancer to develop is greater than it was twenty five years ago but that the many life saving discoveries and sanitary improvements are carrying over a large and increasingly larger number of individual to the cancer age

If it were possible to compare the number of deaths from cancer per annum in each 100,000 of the population above 40 years of age during the last quarter century the rate of increase would be much less only such an increase as might easily be accounted for by improved diagnostic methods. I do not believe that an individual between the ages say of 40 and 60 years is in any more danger of falling a victim of cancer than an individual of the same age twenty five years ago

If this reasoning is correct every successful effort to save the lives of the young and middle aged and carry them over to the more advanced age only adds to the number of cancer victims. Cancer stands like a beast of prey gloating over modern life-saving devices like the safety coupler diphtheria antitoxin vaccination the prevention of yellow fever cholera tuberculosis and other contagious diseases the modern treatment of appendicitis the use of clean milk and better infant hygiene because all these help to swell the army of his victims'

The world has waited long enough for the discovery of a wonderful prophylactic or curative serum which will remove the cancer terror by one fell swoop. It will be necessary to make the best of the present knowledge and especially should a more careful and systematic study of the early symptoms be made

One of the great mistakes of the past has been in withholding from the general public a better understanding of the early signs of cancer and the fact that when discovered early it is, in a large proportion of cases curable

An organized campaign to show the people that early radical operation will save the great majority of cancer sufferers is the crying need of the times. They will have to learn that the mortality from cancer is directly proportional to the length of time that elapses between the date of origin of the disease and the date of its radical removal that cancer is even more an emergency disease than is appendicitis

The almost universal feeling among laymen that when cancer is present the case is hopeless will have to give way to the sentiment that when cancer develops the time for fighting has come. Until this change in the mental attitude is reached there can be little gain over the present results

At present our mortality statistics of cancer have been based on cases relatively advanced. Many cases are undertaken that the surgeon realizes at the time are well nigh hopeless. As the records now run in most hospitals about twelve to thirteen months on an average elapse between the time of the discovery of the suspicious lump or symptom and

the date of the operation This is about as sweeping a denunciation of the prevalent method of dealing with a terrible malady as could be made. This means there are now in the United States more than 100 000 persons suffering from cancers that should be operated and that will be operated within the next twelve months Their chances of permanent cure are decreasing every day

As a result of the large proportion of late operations the operative mortality is unnecessarily high and the number of recurrences so great that layman and doctor alike are disheartened and inclined to ask the question What is the use?

In recording cases it seems only fair to draw a sharp distinction between the early and the advanced cases This should be done at the time of the operation The cases should then be followed and in a few years the contrast between the results of the early and the late operation will be so striking that it cannot fail to convince the public and will go far towards bolstering up the courage of our rather timid profession

It may seem like the pratings of an idealist but I am convinced that the time is coming and I expect to live to see it when cancer will largely lose its terrors when the victim of the disease will report promptly to his doctor the least sign that might be indicative of incipient cancer and when the doctor thus consulted will not dismiss the case with a shrug and the advice to wait and see what develops but will investigate the case to its utmost limits It will then no longer be customary to consider a growth benign until it proves itself malignant but the viewpoint will be reversed More operations on suspicion may be done but myriads of lives will be saved that are now sacrificed as an offering to the present watch less waiting policy

Missiary work of a very comprehensive character will be required to bring about such a change in sentiment and practice Wise publicity seems to be the only remedy

Such an educational campaign needs to be carried on as will reach all classes and conditions Not emotionalism not an alarmist propaganda but clear concise logical state-

ments of facts will be most likely to get the people's attention and convince them

Efforts at publicity cannot succeed if spasmodic but there should be a steady persistent presentation of the proved facts in a simple way People need to be convinced that cancer is curable and taught as much as possible of the early manifestations of the disease in its more usual haunts

It is rather apparent that members of the medical profession need enlightenment also They need to have brought home to them their serious responsibility when consulted in reference to any condition in the least suggestive of malignancy Every physician needs to have clearly brought home to him the difference in prognosis if the operation is done while the cancer is early and still local rather than delayed until it is neither early nor local

Another item of importance is a more careful study and enlightenment on the so-called precancerous conditions and the lesions and conditions that seem to serve as causative factors Irritable scars imperfectly healed ulcers warts moles fissures and the like form the starting point for cancer so often that they cannot consistently be ignored

The greatest forward step ever made looking to lowering the mortality was the organization of the American Society for the Control of Cancer This society was formed in the spring of 1913 and has already done much good Its fundamental object is to investigate and reduce to concrete form all the known facts about cancer and to serve as a center for enlightening the lay and medical public of all the essential facts

One year ago at the meeting in St Louis the Western Surgical Association adopted a resolution endorsing this society and pledging its support With the backing of the best men in the profession and with the powerful aid of many benevolent citizens who have become interested there is little doubt that within a short time the splendid results achieved by the National Association for the Prevention and Study of Tuberculosis will be duplicated and cancer will no longer be a household dread

THE ORIGIN AND FATE OF THE OSTEOCLASTS*

By C. W. PRENTISS A.M. D. PHIL. CHICAGO

Professor of Macroscopic Anatomy Northwestern University Medical School

TWO types of giant cells have been described in the bone-marrow (1) *megakaryocytes* and (2) *polykaryocytes* or *osteoclasts*. The former have large circular or ring-shaped nuclei and according to Wright the blood platelets are derived from their cytoplasm. The polykaryocytes are multinuclear cells and since their discovery by Kolliker have been regarded as the agents of bone-resorption hence termed *osteoclasts*.

Observations as to the origin of the osteoclasts are contradictory. Kolliker and Howell derive them from osteoblasts. Bredichin from fused bone-cells. Ranvier Duval and Bohm from lymphoid marrow-cells. Wegener and Schaffer from the endothelium of capillaries.

More recently Jackson Dantschakoff and Maximow agree that the first osteoclasts arise from enlarged reticular cells of the bone-marrow. These cells possess at first only two or three nuclei and their cytoplasm is *basophilic* and vacuolated. Later their cytoplasm becomes *eosinophilic* and may contain fifty to sixty nuclei.

As to the bone-resorbing action of osteoclasts and how their nuclei increase in number authorities again differ. Kolliker and Jackson hold that these cells actively resorb the bone-matrix and that the nuclei increase in number by cell division. Dantschakoff speaks of the confluence of reticular cells. Maximow believes that the smaller osteoclasts fuse to form larger cell masses with many nuclei. He never observed nuclear division by mitosis or amitosis in osteoclasts and regards them as amoeboid phagocytes. According to Bredichin the osteoclasts resorb the bone-matrix and ingest the bone-cells. F. T. Lewis in his recent textbook declares that there is no direct evidence that osteoclasts resorb the bone matrix. They are rather to be regarded as degenerating cells produced by those conditions which lead to the dissolution of bone. Apparently they are not due to a fusion of cells.

Finally as to the ultimate fate of the osteoclasts it was formerly believed by Kolliker and others that after their resorptive functions were at an end these cells again became osteoblasts. Jackson refuses to accept this view and maintains that the osteoclasts and bone-cells are finally resolved into a reticulum similar to that from which he believes they took their origin. Maximow partly agrees with Jackson but holds that a portion of the osteoclasts undergo degenerative changes and ultimately are completely destroyed.

The observations of the writer were made from the membrane bones of both human and pig embryos, fixed in Zenker's fluid. During the development of a membrane bone like the mandible the cytoplasm of the osteoblasts is gradually used up so that these cells originally columnar and distinct, become flattened and form a syncytium upon the surface of the bone-matrix. Owing to the rapid development of the teeth and their consequent pressure upon the inner surface of the mandible bone-resorption goes on actively about the walls of the dental alveoli and here osteoclasts appear in large numbers. The cytoplasm of the osteoblasts is basophilic and stains blue with hematoxylin while the cytoplasm of active osteoclasts is distinctly *eosinophilic* staining red with eosin.

While the osteoclasts may arise from the reticulum of marrow-cells in the early stages of bone development the writer is convinced that in later stages they arise from the enlargement of the osteoblasts already described as forming a syncytium. There were found all transitional stages between the osteoblastic syncytium with basophilic cytoplasm and osteoclastic masses with vacuolated eosinophilic cytoplasm. Frequently also osteoclasts were seen continuous at either end with osteoblasts. According to these observations the many nuclei of the osteoclasts represent the nuclei of fused osteoblasts. These already form a syncytium before they are converted into osteoclasts. As the area of bone-resorp-

tion of an osteoclast spreads the surrounding osteoblasts become a part of it so that in general the larger the osteoclast the more numerous its nuclei. Nuclear division by mitosis or amitosis was never observed in the osteoclasts although frequently seen in the stratum germinativum of the epidermis in the same sections.

If my observations are correct the osteoblasts are not the only source for the nuclear increase of the osteoclasts. Bone-cells are embedded in the bone matrix and as the matrix is resorbed these are naturally laid bare and become a part of the osteoclasts. Bone-cell *in situ* are each surrounded by a capsule which resists the action of strong acids. This capsule apparently remains after the resorption of the bone matrix and distinct stellate cells resembling bone cell may be seen embedded in the cytoplasm of the osteoclasts. All stages in the ingestion of bone cell by the osteoclasts were observed and it is probable that a considerable number of the nuclei found in large osteoclasts are derived from this source.

There is no direct evidence as to how the bone matrix is resorbed but it is probably decalcified and digested by the action of an acid and a ferment. Whether these are produced by the osteoclasts is not known. The fact that the osteoclasts are in close contact with the surface of bone which is being resorbed points to them as the active agents in the process.

That osteoclasts may be finally resolved into osteoblasts and again form bone is exceedingly doubtful. The writer has seen no evidence of this but has observed many osteoclasts which were undergoing degenerative changes. In some cases bone-resorption and

degeneration of the osteoclasts seemed to go on simultaneously. Osteoclasts were also observed lying entirely within the cavities of blood vessels in the bone-marrow. Such cases were rare and were interpreted as due to the growth about the osteoclasts of the endothelium of developing vessels for it is hard to see how such large cellular masses could pass between the endothelial cells. The osteoclasts observed within blood vessels showed marked degenerative changes the cytoplasm exhibiting granular degeneration while the nuclei were shrunken and pyknotic.

According to Maximow the osteoclasts have much in common with the giant cells of bone tumors and with those giant cells found about foreign bodies in atrophic tissue. This view may be correct and it is the intention of the writer to attempt to settle the question by further investigation and experiment.

SUMMARY

1 Osteoclasts may be formed in early stages of bone development from the reticular cells of bone marrow in later stages from osteoblasts which have ceased to deposit bone and constitute a syncytium.

2 The numerous nuclei of large osteoclasts are derived (a) from the constituent osteoblasts of the cell (b) from bone cells which are ingested as the bone matrix is resorbed.

3 It is probable that the osteoclasts are the active agents in bone resorption but there is no direct evidence at present that they produce free acid or a digestive ferment.

4 Eventually the osteoclasts either atrophy and disappear or are resolved into the reticulum of the bone marrow. It is not probable that they again form bone matrix.

ALKALESCENCE ACIDITY, ANÆSTHESIA

A THEORY OF ANÆSTHESIA¹

By GEORGE W. CRILE, M.D., F.A.C.S., CLEVELAND, OHIO

ALKALIS and bases compose the greater part of the food of man and animals the blood of both man and animal under normal conditions being slightly alkaline or rather potentially alkaline that is although in circulating blood the concentration of the OH ions upon which the degree of alkalinity depends but little more than in distilled water yet blood has the power of neutralizing a considerable amount of acid (Starling Wells). At the time of death whatever its cause the concentration of H ions in the blood increases the concentration of H ions being the measure of acidity that is the potential or actual alkalinity decreases and the blood becomes actually neutral or acid.

To determine what conditions tend to diminish the normal alkalinity of the blood many observations were made for me in my laboratory by Dr. M. I. Menten to determine by electrical measurements the H ion concentration of the blood under certain pathologic and physiologic conditions. As a result of these researches we are able to state that the H ion concentration of the blood its acidity is increased by excessive muscular activity excessive emotional excitation surgical shock in the late stages of infection by asphyxia by strychnine convulsions by inhalation anesthetics after excision of the pancreas and in the late stages of life after the excision of the liver and after excision of the adrenal morphia and decapitation cause no change in the H ion concentration. Either nitrous oxide and alcohol produce an increased acidity of the blood which is apparently proportional to the depth of anesthesia.

Many of the cases studied were near death as would be expected since it is well known that a certain degree of acidity is incompatible with life.

Since alkalies and bases preponderate in ingested food since alkalinity of the blood is

diminished by bodily activity and since at the point of death the blood is always acid we may infer that some mechanism or mechanism of the body were evolved for the purpose of changing bases into acid that thus energy might be liberated.

These observations lead naturally to the question: May not acidity of itself be the actual final cause of death? We believe that it may be so from the facts that (1) the intravenous injection of certain acid causes death quickly and (2) the intravenous injection of acids causes extensive histologic changes in the brain the adrenal and the liver which resemble the changes invariably caused by excessive activation of the kinetic system (Figs. 1 and 2). In view of these facts may we not find that anesthesia and many instances of unconsciousness are in fact phenomena of acidity?

As has been stated already we have found that the H ion concentration of the blood its acidity is increased by alcohol by ether and by nitrous oxide. In addition our tests have shown that under ether the increase of the H ion concentration acidity is more gradual than under nitrous oxide an observation which accords well with the fact that nitrous oxide more quickly induces anesthesia than does ether.

Further striking testimony in favor of the hypothesis that the production of acidity by inhalation anesthetics the method by which anesthesia itself is produced is found in the fact that although the lethal doses of acid cause muscular paralysis yet this paralysis may be mitigated by adrenalin which is alkaline. The observation may explain in part the remarkable success of the method of resuscitation devised by me in which animals killed by anesthetics and a phytan are revived by the use of adrenalin.

In animal under inhalation anesthesia Williams found that no nerve-current could be detected by the Lanthoven string galvanometer.

nometer a fact which might be explained by postulating that nerve currents can flow from the brain to the muscles and glands only when there is a difference of potential. Any variation from the normal alkalinity of the body must change the difference in potential. Since the nerve-currents in animals under anesthesia are not demonstrable by any apparatus at our command and since anesthesia produces acidity then we may infer that acidity reduces the difference in potential. As long as there is life a galvanometer of sufficient delicacy would perforce detect a nerve current until the acidity increased to such a point as to reduce the difference in potential to zero the point of death. If at this point a suitable alkali adrenalin solution can be introduced quickly enough the vital difference in potential may be restored and the life processes will be renewed. Bearing especially on this point is the fact that if adrenalin in sufficient quantities be administered simultaneously with an acid it will not only prevent the fall in blood pressure usually caused by the acid but will also prevent the histologic changes in the brain adrenals and liver which are usually caused by the intravenous injection of acids.

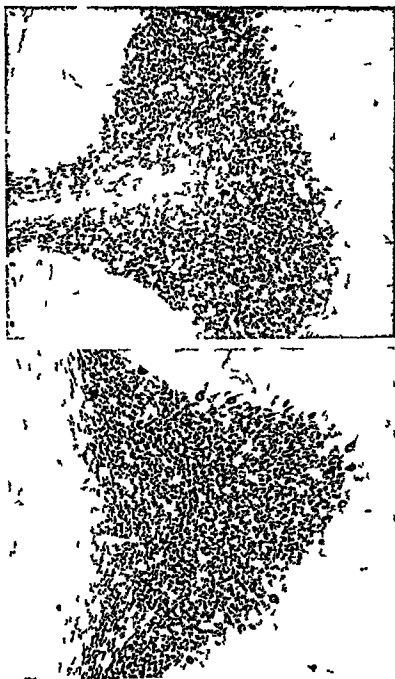
This hypothesis regarding the cause of anesthesia and unconsciousness explains and harmonizes many facts. It explains how asphyxia overwhelming emotion and excessive muscular exertion by causing acidity may produce unconsciousness. It explains the acidosis which results from starvation from uræmia from diabetes from Bright's disease and supplies a reason for the use of intravenous infusions of sodium bicarbonate to overcome the coma of diabetes and uræmia (Fig. 3). It may explain the quick death from chloroform and nitrous oxid and may perhaps show why unconsciousness is so commonly the immediate precursor of death.

One of the most noticeable immediate effects of the administration of an inhalation anesthetic is a marked increase in the rapidity and force of the respiration. The respiratory center has evidently been evolved to act with an increase of vigor which is proportional within certain limits to the increase in the H ion concentration whereas the centers

governing the voluntary muscles are inhibited. In this antithetic reaction of the higher cortical centers and the lower centers in the medulla to acidity we find a remarkable adaptation which prevents the animal from killing itself by the further increase in acidity which would be produced by muscular activity. In other words as the acidity produced by muscular action increases and threatens life the respiratory action by which carbon dioxide is eliminated and oxygen supplied is increased while the driving power of the brain which produces acidity is diminished or even inhibited entirely and the state of unconsciousness or anesthesia is reached. We conclude first that without this life-saving regulation animals under stress would inevitably commit suicide and second that it is probable that the remarkable phenomenon of anesthesia—the coincident existence of unconsciousness and life—is due to this antithetic action of the cortex and the medulla.

Within a few seconds after beginning nitrous oxid anesthesia the acidity of the blood is increased. This rapid acidulation is synchronous with almost instantaneous unconsciousness and increased respiration. If the oxygen in the inhaled mixture be increased a decrease in acidity is again synchronous with lighter anesthesia and a decrease in the respiratory rate.

If these premises be sound we are justified in stating that the state of anesthesia is due to an induced acidity of the blood. If the acidity be slight then the anesthesia is slight and the force of the nerve impulses is lessened but the patient is still conscious of them. As the acidity increases associative memory is lost and the patient is said to be unconscious the centers governing the voluntary muscles are not inhibited however and cutting the skin causes movements. If the acidity is further increased there is loss of muscular tone and even the strong contact ceptor stimuli of a surgical operation do not cause any muscular response and finally the acidity may be increased to the point at which the respiratory and circulatory centers can no longer respond by increased effort and anæsthetic death—that is acid death—follows.



A Section of h m decidua normal

B Section of h m decidua after death from abortion. Compare the fact that the decidua is not as organized as in A.

Fig. 1. Photomicrographs (A and B) showing the effect of abortion on the decidua.



A Section of human cerebellum normal



B Section of human cerebellum after death from acidosis. There are no cells present and the Purkinje cells are barely visible (see arrows)

Fig. 1 Photomicrographs (A, B) showing the effect of acidosis on the brain cells

Against this postulate stand the fact that an infusion of sodium bicarbonate does not overcome inhalation anaesthesia. How valuable this fact may be I do not know. Certain clinical phenomena are clarified by this postulate and serve to substantiate it. For example it is well known that inhalation anaesthesia precipitates the impending acidosis which results from starvation from extreme Graves disease from great exhaustion from surgical shock and from hemorrhage and which is present when death from any cause is imminent.

We see therefore that anaesthesia is made possible first by the fact that inhalation anaesthetics cause acidity and second by the antithetical adaptation of the higher centers in the brain and of the centers governing respiration and circulation.

In deep contrast to the action of inhalation anaesthetics is that of narcotics. Deep

narcotization with morphine and scopolamine is induced slowly the respiratory and pulse rates are progressively lessened and there is no acidity.

By our researches we have established what constitutes the generic difference between inhalation anaesthetics and narcotics. In our experiments no increase in the H-ion concentration was produced by morphine or by scopolamine no matter how deep the narcotization. In animals already narcotized by morphine the production of acid by any of the acid producing stimuli was delayed or prevented. On the other hand in animals in which an acidity had already been produced by ether by shock by anger or by fear the later administration of morphine delayed or inhibited entirely the neutralization of the acidity. In other words morphine interferes with the normal mechanism by which acidity is neutralized possibly



Fig 3 A

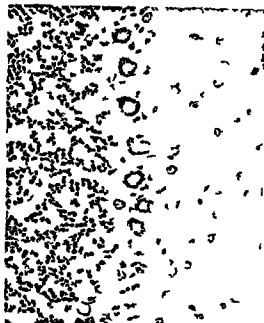


Fig 3 B

Fig 3 Photomicrographs (3) showing the effects of alkalis and acids on the brain cells. A Section of cerebellum of cat normal. B Section of cerebellum of cat after injections of leucine and creatine. Compare the generally destructive effect of these acids with the protective effect of alkalis. C Section of cerebellum of cat after injections of sodium bicarbonate. The protective effect of the alkali is strikingly shown by the general hyperchromatism. Compare the effect of acid in B.

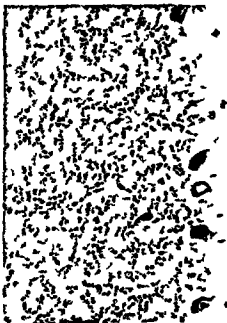


Fig 3 C

because its inhibiting action on the respiratory center is sufficient to overcome the stimulating action of acidity on that center for as we have stated the neutralization of acidity is in large measure accomplished by the increased respiration induced by the acidity itself.

SUMMARY

Acidity inhibits the functions of the cerebral cortex but stimulates those of the medulla. This antithetical reaction to the stimulus of increased H^+ ion concentration is an adaptation to prevent animals from committing suicide by over activity since the mechanism for the initiation and control of the transformation of energy is in the higher centers of the brain while an essential part of the mechanism for the neutralization of acidity—the centers governing circulation

and respiration—is in the medulla. This explains many clinical phenomena why excessive acidity causes paralysis why there is great thirst after inhalation anaesthesia after excessive muscular activities excessive emotions after all those activities which we have found to be acid producing for water like air neutralizes acids. The excessive use of alcohol anaesthetics excessive work in tense emotion all produce lesions of the kidneys and of the liver. The explanation may be

in the fact that all these stimuli increase the acidity of the blood and that if long continued the neutralizing mechanism must be broken down and so the end products of metabolism are insufficiently prepared for elimination.

In view of these considerations we may well conclude that the maintenance of the normal potential alkalinity of the blood is to be estimated as the keystone of the foundation of life itself.

ACQUIRED MEGACOLON¹

REPORT OF A CASE

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THE clinical aspects of megacolon both congenital and acquired have been made fairly clear by the report of many such cases in the literature of recent years but the etiology still remains more or less shrouded in obscurity. The history and findings in a case coming under observation seem to the writer to make it of sufficient interest to justify its report. The patient is a white male thirteen years of age one of three children of German parentage with a good family history. He was to all appearances a perfectly normal child well developed physically and mentally he did not suffer from constipation nor did he present evidence of intestinal disturbance in early life. At the age of seven he suffered an attack of scarlet fever complicating which he had a thrombo arteritis of the left popliteal artery the circulatory disturbance for a time threatened the integrity of the leg but the latter was finally fully restored by collateral circulation. The thrombus formation was repeated in the pelvic veins giving rise to local congestion oedema of hip and obstructed venous return in the right leg. This illness was regarded by his family physician as typhoid fever and treated as such in any event his recovery was quite slow and tedious but at the end of some month the

circulatory balance had been apparently restored. Constipation which was first noted during the attacks of thrombophlebitis now became marked and bowel movements were secured with increasing difficulty. At the age of eight or one year after the onset of thrombo arteritis the first abdominal distention was noted. During the ensuing five years the abdomen gradually increased in size and spontaneous bowel movement ceased entirely the semi solid faeces passing incontinently during sleep in the prone position. At times the evacuation of gas and faeces would be interrupted for some days during which the violent peristaltic efforts of the intestine were plainly visible through the thinned abdominal wall. With the exception of such interruptions there was a constant flow of semifluid faeces during sleep which usually occurred in the prone position. No faecal evacuations occurred during waking hours except when the patient was lying on his abdomen.

He again came under observation in July of the present year at which time his condition was as follows. Height 56 inches mentally dull skin sallow and muddy subcutaneous fat scant musculature poorly developed arms and legs small abdomen enormous measuring 44 inches in circum-



was found about two inches above the levator ani muscle. The caliber was small and a curved broad ligament clamp was introduced through it with difficulty; the blades separated and the stricture divulsed. A large quantity of greenish semisolid feces escaped at the time and continued to do so for the ensuing twenty-four hours. During the following week soap-suds enemata produced copious evacuations, reducing the circumference of the abdomen at the umbilicus from forty-four inches to twenty-two. Dilatation of the stricture with a Wales bougie at stated intervals has been the only post-operative treatment employed. Control of the fecal evacuations was promptly regained and a normal bowel movement occurs daily without the aid of purgatives or enemata. The boy's physical and mental condition has materially improved so much so that it is questionable if further surgical measures other than divulsion or dilatation are indicated. X-ray examination shows the bowel to have decreased in size; the anastomotic opening to have closed; and the button lying on the upper face of the stricture.

Viewing the case in the light of its subsequent history, I believe the anastomosis to have been needless, but unfortunately it was made before I was aware of the presence of the stricture.

There is no history of syphilis in either of the parents, nor are syphilitic phenomena present in parents or children. The tuberculin test is negative and physical examination as far as tuberculosis is concerned is negative. The origin of the stricture most probably finds its explanation in a fibrosis dependent upon the tissue changes incidental to the thrombophlebitis. Inasmuch as it readily permitted the entrance of the barium sulphate emulsion from below at the same time almost completely obstructing the passage of feces from above, the inference of a valve action seems clear. The gradual development of the abdominal distention following the onset of marked constipation with the findings and the subsequent history would indicate that the fecal stasis and dilatation of the colon were secondary to the obstruction and not of the congenital or idiopathic type.

PANCREATIC CYSTS'

WITH REPORT OF A CASE

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PANCREATIC cysts while quite rare do not occur so infrequently. We believe that a number of cases have never been recorded and that the histories of others exist in hospital reports, lectures, etc., so that recourse to them is attended with considerable difficulty. The diagnosis of the condition is not easy consequently a number of cysts have escaped recognition especially in communities where autopsies are seldom done. Oser was able to collect records of 133 cases and we add 55 to this number.

It has been our good fortune to have had three patients with pancreatic cysts under observation and strange as it may seem no two of the cysts represented the same type. It is also noteworthy that we failed in all instances to make a correct diagnosis until an operation was resorted to.

Cysts of the pancreas show three varieties.

First retention cysts. This type of cyst is due to an obstruction to the outflow of pancreatic secretion. The obstruction may be caused by a chronic indurative pancreatitic neoplasm of the pancreas, pressure from without an impacted gall-stone or a concretion in the duct of Wirsung. Senn does not accept the retention theory in its entirety and as a modification of it he suggests and backs up by some very able work the idea that the hindrance to absorption is more important in the production of a cyst than the actual obstruction to the duct of Wirsung. The development of a cyst from retention in the salivary gland physiologically closely akin to the pancreas makes us think that a retention cyst of the pancreas is an entity. It may be stated however that the closure of the duct of Wirsung is not always followed by cyst formation but this fact may be explained by a patent accessory duct (Santo-

rini). Retention cysts present a variety of sizes, may be single or multiple, may or may not be lined with epithelium and the cyst contents may contain all none or any combination of the pancreatic ferments. The cyst wall is made up of very dense fibrous tissue in which is often imbedded pancreatic tissue.

Second proliferative cysts. This type of cyst represents a condition quite similar to a multilocular cyst of the ovary. Proliferative cysts may be caused by a degenerative process similar to that found in the breast or they may be due to a proliferation of the epithelial tissue of the gland. Like the retention cysts they show many sizes, are lined by columnar epithelium one or many layers thick, and the cyst contents may contain any combination of the pancreatic ferments. Proliferative cysts often become malignant and metastases are found in the liver, bone and elsewhere.

Third apoplectic or pseudo cysts. This type of cyst results from an injury caused by some external violence or from an acute hemorrhagic pancreatitis. Pseudocysts are attached to the pancreas and are found most often in the lesser peritoneal cavity. The cyst wall consists of dense fibro-elastic tissue and is usually free from pancreatic tissue except in the region where the tumor joins on to the pancreas and here we may or may not find small areas of gland parenchyma. If the laceration of the pancreas at the time of the injury is great some of the ferments may escape and as a result a pseudo cyst may contain all of the pancreatic ferments but such an occurrence is unusual. The absence of ferments in a pseudo cyst is more frequent than the presence of them.

The diagnostic importance of the pancreatic ferments in the contents of the cyst has brought forth considerable discussion pro and

con Oser states that the presence of trypsin is sufficient to warrant the diagnosis of a pancreatic cyst while Opie asserts that

the presence of one or more ferments resembling those of the pancreas were formerly believed to give sufficient proof that the cyst had its origin in the pancreas. Not infrequently one or perhaps all of these enzymes are absent in the contents of a pancreatic cyst whereas fat splitting diastatic or proteolytic ferments are found in the fluids not derived from the pancreas. In two of our cases we looked for the ferments. In one a large proliferative cyst all three were present in another an apoplectic cyst none were found.

The presence of a pancreatic parenchyma in a cyst wall is positive evidence of pancreatic cyst but the converse of this statement does not necessarily hold true. The most important aid in the diagnosis of a pancreatic cyst are the location and attachment of the cyst the presence of pancreatic ferment in the cyst contents and the occurrence of pancreatic tissue in the cyst wall.

The symptomatology varies according to the site causation and rate of growth of the cyst. Often there is no definite manifestation before the appearance of the tumor and later the symptoms are due to the presence of the cyst. In cases due to chronic pancreatitis there will have been dyspepsia loss of weight and epigastric pain extending over a long period of time. According to Mr Mayo Robson bulky pale actions with undigested muscle fibers and excess of fat will generally be present when the disease is due to pancreatitis. When there is a hemorrhage into a preformed cyst the symptoms rapidly become severe and may necessitate active treatment. There is usually a rounded tumor in the left hypochondrium between the costal cartilages and the midline. As a rule the cyst is movable often transmits pulsations from the aorta but is not expansile. The smaller deep seated cysts are likely to suggest a solid tumor while the larger superficial cysts may give the feeling of fluctuation. A large cyst may interfere with the descent of the diaphragm and embarrass respiration may press on the portal vein or inferior vena cava and cause ascite



Fig. Radiograph showing indication on great nature from pressure of tumor

or on the intestines and give rise to obstruction of the bowel.

The case that we wish to record is that of a pseudo or apoplectic cyst about the size of an orange arising from the lower border of the body of the pancreas and presenting forwards under the stomach and colon. A diagnosis in this case was not made until the operation in fact the operation was in the nature of an exploration for carcinoma of the stomach.

CASE I. Mr H. age 51 farmer married. Complaint (a) Tumor in stomach (b) fullness and bulging in the stomach. Family history Father died with cancer of the bowels. Sister died with cancer of the womb. Personal history Always healthy typhoid at 12 years no complications or sequelae indigestion for past 25 years or more appetite always good and bowels regular gas and nausea after meal but no vomiting. Habits good.

Present illness For past three or four years indigestion has been growing progressively worse. Bloating and fullness in part of stomach has been very discomforting. Pain in epigastrium coming on several hours after meals relieved by taking small quantities of food or a glass of water. Pain would often become excruciating on an empty stomach. Has had a occasional vomiting spell but at no time has there been blood or altered blood in his vomitus. Some gas and nausea after a large meal. Appetite large and he enjoys his meals very much.



Fig. 2. Stomach part after emptying, indicating the location of the mass.

For the past two or three years has been troubled with diarrhea. Stools have been natural looking — no blood, never tarry nor clay colored. Has lost about fifty pounds in weight. Six or eight weeks ago he noticed for the first time an enlargement about the size of his fist in the upper part of his abdomen. Does not remember having had an injury to abdomen. About three months ago he suffered two or three days with a severe pain in the upper portion of abdomen. This pain was so severe that it incapacitated him for two or three days.

Physical examination. Negative except for a mass movable with respiration about the size of an orange located in upper part of abdomen to left of the midline. The mass was smooth round and extended from the upper border of the rectus abdominis to the left hypochondrium. No pain elicited on palpating the mass. Liver and spleen not palpable. The patient's color was somewhat sallow and he had apparently lost considerable weight. Sclera white and showed no evidence of jaundice. Blood: Hemoglobin 85 per cent, white blood corpuscles 7,800, differential count 63 per cent polymorphonuclears, 28 per cent mononuclears — transition to eosinophils and neoclassified. Urine negative, stool negative. Stomach: Barium swallow test meal removed at expiration of 4 hours, 20 cc mucus recovered. Digestion poor. No blood. Total acidity 1 per cent. Free hydrochloric acid 11.5 per cent. Non-lactic acid non-occult blood.

Microscopic examination negative. Stomach capacity 170 cc. Stomach outline natural.

X-ray. Serial radiographs of this case revealed a rather small stomach, the lesser curvature type, the position of the abdominal cavity being higher than



Fig. 3. A. Cut surface of pancreatic cyst. B. External view of pancreatic cyst.

is usually seen. On the greater curvature about the junction of the transverse with the vertical portion of the organ was seen a broad shallow indentation, the margin of which was perfectly smooth. This indentation was not constant in depth on different plates, at times being almost obliterated, especially as the stomach tended to empty itself. No other noteworthy points were detected.

To sum up the history, we have a man of 50 years, strong family history of cancer, who suffers from indigestion for 25 years, diarrhea, pain in abdomen, and finally a tumor in the region of the stomach. In spite of the fact the X-ray findings suggested that the tumor did not lay in the stomach, we advised operation for cancer of the stomach.

July 27, 1913. Under ether anesthesia we opened the upper abdomen by midline incision. To our astonishment the stomach appeared perfectly normal, but when the stomach and colon were massaged about the size of a large orange had invaginated itself. This mass was adherent to the colon, the small bowel, the aorta, and the greater omentum. It pushed the stomach up and gave it a slight hourglass appearance. By blunt dissection and traction on the bowel and omentum, the proper dissection was soon loosened, the mass from the adhesion and came to the pedicle. The mass was attached to the lower border of the body of the pancreas, just external to the aorta. At one time we thought we had a non-expansile aneurysm as the tumor was attached to the aorta by loose adhesions. The pedicle of the cyst was about one inch in diameter. This was severed and the pancreatic area from which the tumor was removed covered. Liver normal, pancreas slightly indurated.

His convalescence except for the first 10 or 12 days, was satisfactory. He left the hospital a good shape August 5.

Pathological report. Tumor about size of orange, smooth in contour, slightly oval in shape, with numerous fibrous tags attached to the capsule, brought to the laboratory within a few minutes after its removal. On section the cyst contained a

found to be made up of clotted blood in a firm state of preservation. The central portion of the cyst consisted of fresh blood clot while the peripheral portion was a clot of some standing and was adherent to the cyst wall. The cyst wall was about one mm in thickness tough and elastic. Microscopically it was found to be of dense fibro elastic tissue. No evidence of epithelium or gland parenchyma at the junction of the cyst wall and the blood clot was newly formed scar tissue which gave the appearance of a clot undergoing organization. The cyst contents contained none of the pancreatic ferments.

In the absence of pancreatic ferments in the cyst contents and of pancreatic parenchyma in the cyst wall we believe that the cyst represents a pseudo cyst rather than a hamorrhage in a performed retention cyst.

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OVARIAN FIBROIDS

WITH REPORT OF SIX CASES¹By ALFRED M. HELLMAN, M.D., FAC.S.S., YORK
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ALTHOUGH by no means unique the condition before us is still sufficiently rare to warrant the report of every case that is carefully studied. As an idea of how infrequently ovarian fibroids do occur it will be good to bear in mind that in 1902 Peterson could find only 82 cases in the literature. After he called attention to the condition in America a number of other cases were reported one here one there but these only proved the rarity for many observers with large gynecological and pathological material stated that the case they were reporting was only the first or second of its kind they had ever seen. Olshausen found only 12 in 293 ovarian tumors and Orthman only ten in 527. Bischoff in the year 1903 found only four cases in Leopold's laboratory in Dresden.

In the Frauenklinik of the Königl. Charité of which Professor Lanza is the head and where this work was done 4500 pathological specimens have been examined microscopically in preserved since April 1, 1904 a matter of a little over ten years. This is an institution where many women are operated upon each year and over 6000 annually attend the Poliklinik. And yet in these ten years only sixteen of kind of the ovary could be found after most thorough search by Dr. Althaus and myself.

Probably not 2 per cent of all ovarian tumors are fibroid. Althoff in his *Pathologische Anatomie* 1911 remarked: "Connective tissue tumors are much less common than epithelial tumors. In the ovary are seen fibromas partly hypertrophic keloid like corpora fibrosa also adenofibromas, leiomyomas and fibromyomas. We do not consider adenomatous tumors as at all belonging to the cases here under discussion. Kautner in his *Lehrbuch der Gynäkologie* states: "Ovarian new growths from the terma are fibromas and sarcomas and are rare in

comparison to ovarian parenchymatous new growth. The literature on this subject is sufficiently voluminous but has failed to clear up a number of points and it was with the hope of throwing light on some of these disputed questions that we studied our cases with the greatest thoroughness.

After a careful review of the literature most of which is unsatisfactory and unconvincing we carefully studied our gross specimen took numerous pieces from various portions for microscopical work and the smallest tumor (Case 3) we cut serially. Of course with the larger specimens this would be practically impossible. All sections after being cut were stained. First those that had been prepared in the freezing microtome were stained with uddan hamatoxylin so that the fat would show up red and the other tissue blue and then the Nile blue stain was used to make the neutral fat red the other fats dark blue and the nuclei light blue. Then the paraffin sections were stained with hamatoxylin eosin to make the nuclei blue and everything else red and finally the van Gieson stain was used to make the muscle fibers yellow or brown and the connective tissue red. The histories in all case reports were carefully studied the patient sent for and those who reported were again examined.

ETIOLOGY

The age at which this condition can arise in a female is probably any time after the onset of the menses our largest tumor coming from a patient of seventeen. Most cases occur around the menopause or later. Of our six cases three were still menstruating at the time of operation and three had passed the menopause. In one case the condition was associated with a fibroid of the uterus but in none of our cases were both ovaries involved. Whether married or single the number of children the activity of sexual life



Fig. 2. Case 2 Path N 84. Photograph of cross section of fibroma of ovary with many blood filled cysts.



Fig. 3. Case 3 Path N 773. I fibroma II cystic trophic ovarian tissue III blood-filled cyst.

seemed to have no noticeable bearing. The interesting etiological factor is from what tissue of the ovary does the fibroid arise and thus despite all our work we could not decide absolutely. Some of the more important views we will now give in brief.

Aschoff says: "The origin of these tumors is uncertain. Scanzoni divides the tumors into those that can and those that can not be shelled out and claims that those that can be are derived from the corpus luteum. Rokutansky believes that fibroids start around circumscribed nodules in the corpus luteum and that a strand from this goes into and finally involves more or less of the entire ovary. Brothers reported a case of hemorrhage of an ovary not removed which six years later had become a fibroid. Krommer and Koeberle think that many corpus luteum fibroids have this origin. Kirwisch believes that their origin is inflammatory from a fibrous exudate that develops into connective tissue and that the source of the inflammation is child bed. But this is not possible as the condition is almost as common in nulliparae as in mothers. Virchow's view was that the tumors were due to an inflammation of cirrhotic nature. Klob Peaslee and Olshausen believed in an inflammatory origin. Waldeyer says that inflammation has nothing

to do with the etiology of this condition. Klebs says that the rich blood supply of the corpus luteum speaks for an origin there. Patenko believes that fibroids arise from the sclerotic changes in follicles and blood vessels. Schauta says they come from the corpora fibrosa or corpora lutea. Pfannenstiel thinks that the corpus luteum origin is not proved and that fibroids arise from the walls of bursted follicles but he offers absolutely no proof. Giebel says some arise from the corpus luteum and some from the stroma of the ovary and this more nearly coincides with our own views. Though we admit we cannot prove the origin of these connective tissue tumors we firmly believe that their origin is as variable as is the appearance of these tumors themselves. They must arise from the connective tissue of the ovary and connective tissue can be found in the stroma in the corpus luteum in the corpora fibrosa in organized blood clots and in the capsule. When there is muscle present it most probably comes from the muscle fibers of the vascular system or from normal muscle fibers at the hilus ovarii. What causes this sudden new growth this sudden increase in normal connective tissue elements? I should say inflammation mechanical as hemorrhage or hyperemia bacterial



Fig. 4. Case 5 Path. N. 3444. Photograph of tumor cut lengthwise. Tumor measured 56 cm. by 4 cm.

following infection cirrhotic from retrogressive changes at the menopause. Or, thus last possibly a chemical reaction as has been suggested?

SYMPTOMS

The symptoms are of course subjective and objective. The subjective are notably few. The most common thing is that the patients notice a swelling of the abdomen which has come on slowly unless there has been a disturbance in the tumor's circulation when it may have come rapidly. There may be pain either dragging on the side of the tumor or sharp and referred to a distance from pressure on a nerve trunk or there may be sharp pain over the tumor due to local irritation (peritonitis). There may be frequency or retention of urine. There may exist most annoying constipation. One case has been reported by Bissel where there was severe uterine bleeding. One of our cases suffered from fresh blood in the stools plus the constipation. Loss of weight was complained of in two and is recognized as a frequent accompaniment of this condition.

On examination the tumor is felt, except rarely as in one of our cases where it was an accidental post operative find and too small to have been felt. It is as a rule movable but may be bound by adhesion to the broad ligament. Usually it is not connected with the uterus and moves separately from it. A diagnosis more exact than tumor of the ovary is often not possible. These tumors are generally hard to the touch and in at least 5 per cent of the cases there is ascites. In two of our cases this condition was present. The cause of such ascites has long been under dispute. It may be mechanical (Olshausen) it may be chemical (Lannenstiel) it may be due to hyperæmia (Schauta) and according to Schatzchen it may be due to secretions from the degenerating tumor.

DIAGNOSIS

The differential diagnosis is unusually difficult and lies between ovarian fibroid and other adnexal tumors and sometimes may be mistaken for pedunculated uterine fibroid. Sometimes no definite diagnosis can be made until operation. It is to be remembered however that these tumors are hard rarely cystic rarely double-sided and as a rule freely movable aside from the uterus and there is a noticeable absence of subjective symptom. He not misled by the ascites and loss of weight into concluding that malignancy is present.

TREATMENT

The method of treatment can be stated in one word — operation. All ovarian tumors should be removed as soon as discovered through an incision large enough to remove them entire and when cystic care should be taken not to puncture. If at operation malignancy is suspected the uterus and opposite adnexa must be removed also. All other form of treatment must be reserved for cases where operation is strongly contra-indicated. Medical therapy and massage are useless. Röntgen and other ray therapy may have helped in some few cases. *Kunstliche Hohensonne* has not yet been sufficiently tried but there is little reason to expect much of it in such conditions.

PROGNOSIS

The prognosis is good. If the pathological report is trustworthy fibroid or fibromyoma and not sarcoma the case needs no further watching. Rokitsansky claims that all double sided tumors are more or less malignant but this can scarcely hold for double ovarian fibroids as several cases positively non malignant though double sided appear in the literature. The so called fibroma ca chetia and the ascites pass away gradually but directly after the removal of the tumor.

CLASSIFICATION

These tumors can be classified in many ways. Kroeber classifies them as follows:

1. Fibroma ovarii
 - a. Diffuse
 - b. Circumscribed
2. Fibroma corpus luteum of Rokitsansky
3. Fibroma papillari ovarii of Plan
4. Myoma

They have also been divided into *zellreich* and *ellarm*. Sanzoni divides the tumors into those that can and those that can not be shelled out. Basso divides them into *fibroma papillara superficiala* and into *fibroma diffusum*. O. Frankel classifies them simply as fibroma with or without ovarian rests. This is as satisfactory as any method.

PATHOLOGY

We will give an account of the pathology of these tumors first as described in the literature and then as found in our own six cases. Ovarian fibroids vary from the size of a cherry pit entirely enclosed in ovarian tissue to tumors weighing 30 kg (Jacobi) and 40 kg (Clemens). Patenko says they cannot grow larger than a goose egg and still be fibroid but this has been proved incorrect. The tube is as a rule free and the tumor itself also but may have grown intraligamentary. Leopold found in nineteen cases of ovarian fibroid that three were double sided but this is a higher percentage than common. They are as a rule hard irregular and have more or less the shape of the normal ovary. Leopold says the hilus of the ovary can always be seen but this is not accurate. The

hardness may be fibrous or chalky or bony but if the tumors are cystic or rich in blood or myxomatous or undergoing degeneration, they may be of variable degrees of softness. The color too depends largely on the contents. If there is little blood they are whitish or yellowish white brown red if rich in blood and almost black if the hæmorrhages are of long standing. If there is much hyaline degeneration present they will appear on cross section glistening white and somewhat transparent. This cross section shows a periphery that is homogeneous yellow or ivory in color. In the middle cross fibers are easily seen. Strands cut lengthwise are glistening white (suggesting hyaline degeneration). Those cross-cut are dull gray and if there has been hæmorrhage it may look like a map. The solid parts on section even in the cystic variety are compact. The tumor always involves all or part of the ovary.

Under the microscope many combinations and many different pictures may be seen. To call the tumor a fibroma or fibroid certain features must be noticed and a definite absence of other things. In the end the diagnosis must rest on these microscopical findings. There must be a certain regularity of the individual fibrous or muscular cells and strands despite varying quantities of cell fibers vessels and degenerative changes. The fibrous cells are as a rule short and spindle shaped. The protoplasm surrounds the nucleus only very slightly. The nucleus is slightly bent or pointed. Edema is extremely common and very variable in degree. It may be scarcely noticeable or so extensive as to cause large areas to exist almost free of cells. Real necrosis is present in large tumors and seen as large structureless masses. With van Gieson stain large red hyaline masses exist. Among the more common changes mentioned in the literature are chalk deposits as described by Williams, Polano, Hollander, Casalis, Strassmann, Jones but none of our six cases showed this. Bone is likewise described by Lobb, Kroeber, Kleinwächter and Waldeyer but we found none. Thrombi are seldom seen but after large thrombi or with torsion of the pedicle we find hæmorrhage and blood-clots in

various stages of organization. Cystic follicles are found and may include glands called by Adler *fibroma intracanalicular* and by Pick and Koch *adenoma endometrioides*. My idea is that these cases do not belong strictly to the group under consideration whatever their connection may be. Myxomatous changes may also be found. Fatty degenerative changes which are mentioned by Basso as being extremely rare are probably not more often described because there is not as a rule a proper search made for fat in the microscopical sections. We found fat in three cases (Cases 1, 2, 5) out of our series of six. It is certainly a degenerative process and we believe that it exists in all fibroma ovarii of considerable size. Muscle strands were found in many cases. Basso collected forty-five and others have since been added. This muscle must be derived from the normal muscle of the ovary at the hilus or from the muscles of blood vessels as is believed by Seeger Basso and Losinski. In some cases the connective tissue has disappeared (Sangalli, Pernzy, Orthman, Doran, Henroten and Herzog and Seeligmann). Teissonière says that fibromyoma are more common than pure ovarian fibroids but this is probably not correct. If any epithelial elements are found one must classify the tumor elsewhere. Fibroma is distinguished from sarcoma in its regularity and in the shape of its cells. Sarcoma cells are rich in plasma, have various shaped nuclei, mostly oval and more or less myotonic figures.

Our cases varied in age from seventeen to sixty. Two were past the menopause, one eight years, one three years. Four were still menstruating, one being forty-seven years old. Four were married, two were unmarried.

Of the married patients one had had four children, one three children, five miscarriages and three curettages, one six pregnancies and one miscarriage and one twelve labors. All had otherwise a previous normal menstrual history. Leucorrhoea was present in one case. Pain in the back and lower abdomen chiefly on the side of the tumor in one case. Constipation was present in two cases, blood in stool in one of these. There was frequency of micturition in one case, retention in another.

There was simply pain in the pelvis in another. One patient complained only of enlargement of the abdomen and one complained of swelling of the abdomen with other symptoms. The patient of sixty-three years after the menopause had had three days of uterine bleeding as her only symptom. There was loss of weight in two cases, both of which showed objectively ascites. In the two conditions generally coexist and may possess some definite relationship. In five of the cases the tumor was large enough to be felt and was movable.

Our smallest fibroid (Case 3) was an accidental find. It was circular and measured 1 cm in diameter. Our largest in the twenty-year-old girl was 56 by 78 cm in circumference and weighed 13 pounds. Two of the tumors contained each a small cyst. One was polycystic (Case 2) and here the cysts were filled with old more or less organized blood. None of our cases showed bony or myxomatous changes or calcification. All the tumors were somewhat the shape of a normal ovary.

CASE 1. K. K. age 32, pathological No. 57. Previous history negative. For some months the patient complained of pain in the pelvis, loss of weight and increase in the size of abdomen. She was somewhat emaciated and had a large movable tumor with considerable ascites. Operated upon April 4, 1906 and died 5 days later of peritonitis.

Tumor after being in formalin 8 years had circumference of 53 cm and a diameter of 17 cm, hard, slightly irregular, ovarian in shape and pear gray in color. Cross section showed fibers running in various directions, no calcification, no bone and myxomatous changes, no cysts.

At roscopical examination. Under a connective tissue capsule rich in vessels is a tissue with spindle cells arranged with its cells crossing one another in different directions. The nuclei are regular, staining properties some with rounded, some with pointed ends. In another part of the tumor one finds cells separated by edema. Here are seen leucocytes and blood infiltration and necrosis of the tumor tissue. Still another part shows only necrotic tissue with stagnation in the vessels. The tissue stained with sudan and Nile blue shows much fat in the form of large droplets in many of the cells. Smaller dustlike particles of fat are seen especially in the neighborhood of certain thrombotic vessels.

Diagnosis. Fibroma of ovary, rich in cells, the tumor being partly necrotic and softened.

CASE 2. F. L. age 56, pathological No. 1824. The patient menstruated regularly from 17 to 40

years of age profuse bleeding eight days without pain. She had had six pregnancies one miscarriage one curettage. For about eight months she had noticed swelling of abdomen there was some pain on the left side which was worse on bending there was some bladder pressure with frequency at night. The bowels were normal no bleeding some slight loss of weight. Physical examination showed a large movable tumor of the left adnexa and some ascites. Operated upon June 10 1909 and later discharged cured. The tumor was dark in color from without interspersed with lighter areas and measured 18 by 14 cm. On cross section it was seen to be polycystic growing from the lower pole of the ovary. The cysts were filled with dark clotted blood and between were many solid parts of rich yellow color (See frontispiece and Fig 1.)

Microscopical examination The tumor is rich in cells with oval and rounded nuclei. Between the nuclei are the finest bundles of connective tissue here and there undergoing hyaline degeneration. Where there are cysts in the tumor there is much blood to be seen with the microscope and around this is tissue having entirely undergone hyaline degeneration. In certain parts of the tumor there is much fat in those preparations stained with sudan and Nile blue. The lymph vessels are in part much filled.

Diagnosis Somewhat cystic degenerated fibroma of the ovary rich in cells. The cysts are filled with altered blood.

CASE 3 E. K. age 60 pathological No 23. Menstrues started at 20 and lasted until 57 every three or four weeks severe. Twelve labors one miscarriage. Patient was bleeding for three days before her admission to the hospital though she had passed the menopause three years earlier. There were no other symptoms. Examination revealed a tumor movable with and closely connected to the uterus. Operation total hysterectomy because of the age of the patient. Patient discharged cured.

The tumor was the size of a man's fist and proved to be a myoma arising from the posterior wall of the uterus near the cervix. On sectioning the ovaries on the one side was found a small fibroma (see photo) about the size of a cherry pit. The diameter is 1 cm. It is situated eccentric toward the outer pole of the ovary entirely surrounded by normal though atrophic ovarian tissue.

Microscopical examination Spindle shaped cells close on one another. The nuclei are oval or spindle shaped. Firmer connective tissue bundles divide the cell groups into fields. Toward the ovarian substance the tumor is sharply differentiated and shows abundance of encapsulated connective tissue in part undergoing hyaline degeneration. The serial examination does not show that the fibroma arose from a corpus fibroma. At the pole are seen dilated vessels entering the tumor and here is also seen small round cell infiltration especially in those parts where the tumor is not so sharply encapsulated but not in the middle of the tumor.

Diagnosis Small fibroma of the ovary rich in cells and with slight hyaline degeneration of the connective-tissue bundles.

CASE 4 M. H. age 17 pathological No 3444. Menstrues started at 14 every four weeks regular lasting four days. April 1912 patient first noticed enlargement of abdomen with absolutely no other symptoms. Operation took place August 26 1912. The patient was discharged cured one tube and ovary having been removed. After being in for malin two years the tumor still measured 56 by 78 cm in circumference. It weighed when removed 13 pounds. Smooth pearl gray surface mostly hard with two comparatively small cysts containing clear fluid. Section similar to exterior but less glistening.

Microscopical examination (See frontispiece and Fig 4.) The tissue is composed of dense and loose connective tissue between which are sparsely seen spindle cells with elongated nuclei. Vessels are present but not numerous. In the soft parts in the neighborhood of the wall the tissue is somewhat more clearly defined though otherwise it appears unusually loose. Here also are found certain bundles which with van Gieson's stain have taken on some Pikrin coloring though in general they appear bright red. In certain places one finds in the tissues pouring out of blood and round cell infiltration. Likewise one finds such round cell infiltration separate from the blood vessels. An other section from a firmer part of the tumor shows a more sharply defined tissue. Here one sees abundance of cells with spindle shaped and rounded nuclei and many larger vessels. Connective tissue cells have become in part intensively stained with red. Muscle cells are not definitely found. An other section of this same tumor shows ovarian rests also cystic primordial follicles.

Diagnosis Fibroma ovarii partly oedematous and softened.

CASE 5 J. B. age 47 pathological No 3531. Married menstrues started at 13 last menses from September 4 to 11 1912. She had had three labors the last of which was 11 years previous. She had had five miscarriages the last one three years previous, and four curettages. For one year she had complained of pain in the pelvis. October 1912 she had pneumonia during which time the pain in the pelvis seemed to become worse. No other symptoms. Physical examination. Small umbilical hernia left sided adnexal tumor size of a fist and scarcely movable. Laparotomy October 31 1912.

A tumor the size of a fist was found blue shiny partly cystic. The cyst had ruptured and the contents had run in all directions. The tumor was adherent to the omentum and intestines. The right tube and ovary were also removed because of the age of the patient and because the tumor looked suspicious of malignancy. The patient was discharged cured.

Hard tumor with smooth surface about the size

of a child's head. On the free edge was a bursted cyst with bloody material. The solid parts have a *Bunte Farbung*. The right tube and ovary are normal. Tumor measured after 18 months in formalin 26 by 34 cm in circumference.

Microscopical examination (See frontispiece). Tumor composed of spindle shaped cells arranged in rows to form a network. Repeatedly the cells are separated by oedema. In many places there are necrotic masses. In some locations about the vessels there is round cell infiltration. In sections from other parts of the tumor one finds the same picture but parts show the oedema developed to the extreme. In one section are found corpora fibrosa and many vessels probably at the hilus of the ovary for here are seen hilus gland. In other parts there is no necrosis. In one section a corpus fibroma shows cysts. The ovary of the other side shows very many corpora albicantia and atretischer follicles. In the necrotic parts much fat is to be found stained in part with sudan and called *Fett nhäufung* (fat accumulations).

Diagnosis Fibroma ovarii. In part oedematous and necrotic and with much fat.

CASE 6 S. age 24 pathological No 3698 Unmarried but admitted intercourse. From December 1912 she complained of pain in back and lower abdomen chiefly on the left side. She always suffered from severe constipation but of late there was fresh blood in the stools. Menses were every four weeks lasted three to four days plenty but painful. Operated March 8 1913. Left salpingo-oophorectomy. Patient discharged cured. Patient was examined again July 1914 and stated that she was in perfect health with normal menses every four weeks lasting three days. She had some leucorrhoea. The Plan entiel incision was scarcely discernible and except for slight retroversion and absence of left tube and ovary everything was normal.

Pathological examination 1 piece of the right ovary is a tumor the size of a fist. Circumference being 17 by 17 cm the largest diameter 8 1/2 cm. Pearl gray glistening surface. On section dull grayish white. No cysts. The tube seemed normal.

Microscopical examination The tumor consists of a network of connective tissue with nuclei that are partly elongated and partly round. The bundles are dense and appear often as hyaline bands close about the vessels which are abundant and show an adventitia undergoing hyaline degeneration. In some places the cells are in looser tissue where the nuclei are mostly polygonal and starlike. In another part the nuclei are close together the tissue shows much hyaline degeneration (See frontispiece).

Diagnosis Ovarian fibroma with hyaline degeneration.

CONCLUSION

In conclusion I would say the etiology of these rare tumors is still obscure and unsettled. The anatomical origin is variable.

The symptoms are those of a tumor of the adnexa and the diagnosis of fibroid of the ovary can only be made at the operating table. In fact only after the tumor has been sectioned and studied microscopically can one feel sure that it is not a myoma or sarcoma or of epithelial origin.

The treatment is operation. The prognosis is good. The tumors can best be classified as fibroma with and without ovarian rests. The pathology is variable from very small to very large. These tumors are as a rule hard and irregular but may be cystic. They may undergo very many forms of degeneration of which fatty degeneration is probably more common than usually noted. To call a given ovarian tumor a fibroma there must be a definite regularity of the individual fibrous or muscular cells and strands despite all other irregularities. The fibers are as a rule short and spindle shaped the nucleus is slightly bent or pointed and the protoplasm only slightly surrounds the nucleus.

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MASSIVE UMBILICAL AND VENTRAL HERNIAS¹

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W^E distinguish as massive those hernias having a ring of not less than 40 cm circumference or a capacity of 500 cc. also smaller hernias occurring in obese individuals whose pendulous abdominal walls require the removal of an area of skin and fat not less than 10 cm in its short diameter.

These massive hernias present a problem much more complicated than that associated with simple inguinal hernia. Not only are the technical details of the operations difficult in execution but the mortality and morbidity incident to these operations are greater than in the ordinary forms of hernia. For example in a series of 1900 non-strangulated inguinal hernias there were but 4 deaths a mortality rate of a little over 2 per cent while in a series of 197 umbilical and ventral hernias operated on by the same group of surgeons during the same period of time there were 6 deaths about 3 per cent. In this latter series there were 46 massive hernias with 3 deaths, about 6 per cent.

When strangulation complicates the condition the mortality rate in the massive hernias reaches nearly 50 per cent as against 26 per cent in all other forms.

The series of 26 cases which form the basis of this report are from the surgical clinic of St. Agnes Hospital and from my service at the Mercy Hospital Baltimore. In this series there were 4 strangulated hernias. Two of these patients died. Of the remaining 22 non-strangulated cases one patient died on the second day from dilatation of the heart. Sixteen patients were handicapped by lesions other than the hernia: 6 heart lesions, 6 renal, 2 arteriosclerosis, 2 obesity.

The average duration of confinement to bed after operation for inguinal hernia is 12 days and the stay in the hospital 19 days after massive hernia the average is 31 days in bed and 48 days in the hospital the extremes varying between 21 and 125 days.

The causes of death in the massive hernias fall into three groups:

1 Those due to cardiovascularrenal conditions: dilatation of the heart, apoplexy, uræmia, pulmonary oedema, embolism and thrombosis.

2 Post-operative abdominal conditions: post-operative obstruction, acute dilatation of the stomach, peritonitis, suppuration of the abdominal wall.

3 Those due to the strangulations: toxæmia of obstruction, peritonitis from ruptured and gangrenous bowel, embolism of the mesenteric arteries.

The prompt recognition and treatment of the post-operative complication may avert the fatal outcome. Those mentioned in the first group may in many cases be prevented by careful preparation while the complications due to strangulation occasionally may be handled in such a way as to avoid disaster.

With non-strangulated hernias acute cardiac dilatation is the most common fatal complication. The danger of its occurrence has long been recognized and various explanations of its cause as well as methods for its prevention have been urged. With these large hernias the patients carry a considerable portion of the abdominal viscera outside the normal confines of this cavity. There is consequent loss of pressure on the large splanchnic vessels resulting in their dilatation and associated with compensatory changes in the general circulation which sustain the normal blood pressure.

The return of the protruded viscera to the cavity and tight closure of the hernial opening requires a readjustment of the circulatory balance and thereby throws a great burden on the heart muscle. Should this burden be imposed suddenly and especially if it be imposed on a heart weakened by myocarditis, a rapid and fatal dilatation is almost certain to follow.

Kidney insufficiency is a frequent complication of these large hernias. As a rule the

kidney lesion is a chronic interstitial nephritis. We have not only the direct result of the renal insufficiency to guard against but also the vascular hypertension associated with this lesion which adds to the danger of cardiac exhaustion under the burden imposed on the heart by the alteration of the abdominal pressure.

The other complications of this group are related in cause to these two. Additional strain thrown on an imperfect and unprepared cardiovascular system results in damage either to the heart or vessels. Jaundice and gastro-intestinal hæmorrhage with or without ulceration are abdominal complications also due to the additional pressure.

Careful pre operative treatment will reduce the danger from these complications. This preparation may require many days of treatment before the operation can be undertaken. It is rare that a patient suffering from one of these massive hernias is free from some form of cardiovascularrenal disorder and therefore if possible the operation should not be done as an emergency procedure. The high mortality in strangulated cases is in part due to urgent demand for immediate operation which prevents this valuable preliminary treatment. It is therefore of the greatest importance that all patients suffering from massive hernias should be operated on before strangulation occurs that is such patients even though the hernia is reducible should come to operation promptly and at a time when careful preparation will give the best chance for cure of the hernia without annoying or dangerous complications.

The preliminary treatment as we carry it out is a modification of that suggested by Johannes Hahn¹. The patient is put to bed and in addition to the routine physical examination the blood pressure is recorded two or three times a day and a phthalein test for the kidney function is made. A binder is snugly applied to the abdomen padding the hernia should thus be irreducible. The binder is gradually tightened and the effect of this on the blood pressure, heart action and respiration noted. The pressure of the band

age is increased as rapidly as it can be tolerated by the patient and later small flat sand bags applied under the bandage add to the pressure. During this procedure the hernia if reducible is retained by a pad pressed into the opening and if irreducible is so surrounded by cushions of cotton and gauze that the pressure does not increase the amount of its contents.

Respiratory difficulty, rapid change in blood pressure, irregularity of the heart and gastro intestinal disturbances are signals for the relief of pressure and against any operative procedure.

The diet is restricted to liquids and soft solids without milk. The bowels are kept moving freely by daily mild salines rather than by drastic purgatives. We have had no cases in which the hernia and obesity were associated with distinct disturbances of the endocrine system. In such cases the proper glandular feeding should precede operation.

Whenever the kidney function is inhibited as shown by the phthalein excretion the patient is given large quantities of dilute cream of tartar solution and the intake and output of water recorded. The phthalein test is repeated at short intervals and when the excretion comes to a safe point and remains there operation is performed. As in all phthalein examinations a constant excretion even of a small amount offers a better chance for the operation than a larger quantity with wide variations.

This preliminary treatment may last from a few days to one or two weeks according to the severity of the handicap and the manner in which the patient responds to the treatment. The good effect of this method of managing such patients is shown in the following case from our series.

S 4393. Massive umbilical hernia. Female white age 50 single. Quite fat abdomen pendulous with thick fatty layer. Hernia irreducible pear shaped capacity of about 700 ccm. Blood pressure 240. Kidney function 37 per cent trace of albumin and a few granular casts in the urine. This patient was given the preliminary treatment as noted above. In three days the phthalein output reached 52 per cent in two hours while the blood pressure fell to 200. On the fifth day the

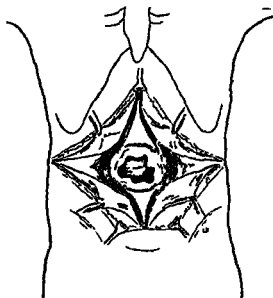


Fig. Showing the four flaps of fascia and the opening of the rect sheath preparatory to the suture

output was 67 per cent in two hours with 3,000 ccm of urine specific gravity 1,008 in 24 hours. At the same time the blood pressure had dropped to 170. The next morning the operation was performed under gas and novocaine anesthesia. Re-breathing sent the blood pressure to 230 but this quickly fell to 200 under direct nitrous oxide. About 150 grams of omentum were removed with the sac and the hernia closed in an ideal way. The patient recovered without any complications. There was enough distention of the stomach to require lavage about 12 hours after the operation, but after this time the patient was not uncomfortable. On discharge the blood pressure was 190 and the kidney function 56 per cent. At the present time 9 months after the operation the general condition of the patient is practically the same as on her discharge from the hospital.

When the massive hernia is strangulated no preliminary treatment is possible and the surgeon must choose between the risk of an immediate closure and the annoyance of a two-stage operation provided the patient is not already in the toxic stage of obstruction. In the latter event the two-stage operation is the only one to be considered. Rapid removal of the contents of the obstructed loop of bowel by an enterostomy is the important indication in these cases. With gangrene added to obstruction the extent

of operation will vary from enterostomy with extrusion of the gangrenous bowel to resection and anastomosis according to the degree of toxemia. As a rule it is better to have an enterostomy above the point of obstruction. When the gangrenous loop is high in the small intestine the lateral anastomosis between the upper and lower healthy areas should be made at the primary operation, even in toxic patients. The end of each segment is left open or sutured around a rubber tube draining the obstructed loops. The anastomotic opening provides a channel through which some nutritive material may pass down the intestine during the closure of the bowel ends and make it possible to close these ends by simple suture as soon as the toxemia is relieved.

Having controlled the obstruction the patient is prepared for the hernial closure in the usual way and this operation is performed as soon as the general condition of the patient and the abdominal wound permit.

The two-stage operation in the absence of toxemia and obstruction is advised by Hahn (loc cit). At the first operation the constricting tissues are divided sufficiently to allow easy reduction of the hernia and the skin is sutured. The hernia is held in the abdomen by a pad and bandage, by means of which the intra-abdominal pressure may be controlled. The preliminary treatment is now carried out and when the condition of the patient becomes favorable the second radical operation is performed.

The history of one of our cured strangulated hernias illustrates a successful method of handling these very ill patients.

S 2739 Massive strangulated umbilical hernia. Female white age 52 hernia many years strangulation 12 hours. Patient very fat with pendulous abdomen hernia enormous. Handicap severe toxemia cyanosis failing heart. The operation was performed by D. Bloodgood under novocaine infiltration. On opening the sac gangrenous small intestine presented itself. The constriction was divided and the bowel withdrawn until sufficient healthy gut was obtained to make a lateral anastomosis beyond the gangrenous segment which was then excised. The divided ends were left open and in each a rubber tube was sutured. The peritoneum was closed around the extruded ends and the wound packed with gauze. The patient recovered from

the toxæmia rapidly under the usual treatment. The ends of the divided small bowel were closed after repeated suturing and finally the radical operation for the hernia was performed two months after the strangulation. The patient is well two and one half years after the operation.

Ruge's study of the pathology and treatment of umbilical hernia throws light on the etiology of this lesion and indicates the ideal to be sought in its treatment. Ruge argues that the proliferation of preperitoneal fat causes one or more defects in the anterior abdominal fascia through which the hernia protrudes. As the hernia enlarges the recti are pushed apart with greater or less degeneration according to the extent of the separation, the duration of the lesion and the general condition of the patient. The lateral separation of the muscles usually extends for a considerable distance above and below the hernial ring leaving a diamond shaped area of the abdominal wall without muscular covering.

Although trauma especially violent exertion during parturition is commonly mentioned as an etiological factor such trauma is simply accessory forcing the abdominal contents through an already existing defect.

Graser² describes what may be called the ideal operation for the cure of these hernias. This operation aims at the restoration of the anatomical condition of the abdominal wall by suture of the recti after excision of the sac and closure of the peritoneum and reinforcement of this suture by overlapping of the rectus sheath and the fascia. The method combines several principles from various hernia operations. Probably the most important are transverse overlapping of the fascia brought out in the Mayo operation for umbilical hernia and wide lipectomy as advised by Kelly.

In the pathological anatomy of these massive hernias, the condition of the rectus muscle is often such that the ideal operation of Graser cannot be performed. We have found the exposure of the upper and lower limits of the separation of the recti a great help in bringing the muscles together over the hernia. This exposure requires the re-

moval of a wide area of skin and subcutaneous fat and may require the removal of a longitudinal segment in addition to the transverse lipectomy. The rectus sheath is opened at the limits of the diastasis and as the muscle is brought out it is sutured to its fellow.

The operation as we perform it whenever possible is as follows:

An elliptic lanceolate incision is made around the hernia through the skin and fat down to the aponeurosis of the external oblique. This incision extends from flank to flank in most cases, but occasionally in post operative hernias through the rectus muscle the incision is made in a longitudinal direction. The short diameter of the wound is of such length that when the lipectomy is completed the pendulous condition of the abdomen will be overcome.

Beginning at the tip of the incision the fat is dissected from the aponeurosis. As the middle line is approached several veins perforating the aponeurosis will require ligation. In many cases these perforating vessels will be accompanied by small protrusions of fat and their situation marks the limit for removal of the preperitoneal deposit. The dissection is carried up to the neck of the hernia and then over the sac, separating the skin as far as possible without opening the peritoneum. Should the sac be opened at this time the contents are retained by a Mikulicz pad.

The upper and lower margins of the fatty layer are now separated from the aponeurosis and retracted until the limits of the diastasis of the recti are exposed. In some cases this will require the removal of another segment of skin and fat extending from the ensiform to the pubes.

Beginning above and below at the limits of this diastasis and laterally far enough out to be beyond the inner edge of the rectus muscle the aponeurosis is divided by incisions radiating to the center of the hernial ring. Far out it is not difficult to separate the aponeurosis from the rectus sheath and so secure a line of cleavage which may be followed when the fascial layers become thin and adherent nearer the hernia. The four flaps resulting from these incisions are re-

tracted and the layer of preperitoneal fat thus exposed is removed. The sac is now opened and the contents reduced. When the contained omentum is adherent and especially when it has been rolled into a firm mass with considerable fibrosis excision of the mass is better than its separation and reduction. The removal of a portion of the omentum reduces the amount of material which must be returned to the abdomen and consequently the post-operative increase in tension. But this removal is not free from danger. Embolism and damage to the circulation of the stomach wall resulting in ulceration and hæmorrhage may follow extensive ligation of omental vessels. The sac is closed by a continuous silk suture and the excess amputated. Occasionally the sac is not opened but the hernia is reduced *en bloc*.

After disposing of the sac the closure is commenced by opening the rectus sheath at the apex of the separation and sewing the posterior sheath and the muscle to their fellows of the opposite side by mattress sutures of silk. The splitting of the sheath and the suture proceed as long as the tension can be overcome. In favorable cases proceeding in this way from above and below the recti can be brought together all the way over the hernia. When the separation is too wide or the atrophy of the muscle too great to permit the complete suture the drawing out of the recti proceeds as far as possible from above and below. There is then left uncovered by muscle an irregular

lens-shaped area near the hernial opening. The sheath is now split laterally and the muscle and posterior layer sutured transversely with as much overlapping as possible. Unless the separation and degeneration have been very great the muscle and sheath will at least be brought in contact over the entire area.

The flaps of external oblique are now sutured. First the longitudinal incisions are closed with imbrication of their edges; then the lower flaps are brought up under the upper ones by a row of mattress sutures, and the edge of the upper flap sewed down in the same manner. A few deep sutures of silver wire or silkworm gut are placed in the skin and fatty layer for tension and the remainder of the skin wound is closed with interrupted silk. Protective drains are placed at the angles and in two or three spaces from the suture line or one cigarette drain brought out from the aponeurosis through a stab wound below the incision. A circular bandage of adhesive plaster reaching from well up on the ribs to the trochanter of the opposite side is applied over the sterile gauze dressing. A many tailed binder covers the entire abdomen.

The post operative treatment is that usually employed after laparotomy with special treatment of any handicap on the part of the individual patient. Practically all the patients require washing out of the stomach for the relief of distention during the first 24 hours after operation.

A PLEA FOR HIGHER HOSPITAL EFFICIENCY AND STANDARDIZATION¹

By HORACE G WETHERILL M.D. F.A.C.S. DENVER, COLORADO

EVERY human endeavor may become vastly more effective if those who are employed in the same or in similar occupations can be brought to see the wisdom of cooperating with each other and coordinating the work they are doing.

Friendly competition is in no particular incompatible with such cooperation. The interchange of ideas and experiences and the combination of forces for the attainment of common ends are as a rule mutually helpful. The most modern and successful scientific surgery is peculiarly dependent upon efficient team work. Everything connected with it from a diagnosis for a particular patient to the compilation of the ultimate results calls for the intelligent and skillful cooperation of many individuals. No single surgeon how ever capable and skillful he may be can hope for the highest success without the direct or indirect aid of his fellows in his own and other fields nor is good surgical work possible without a well equipped hospital in which to work—one in which he may find and collaborate with the trained assistants and laboratory workers now acknowledged to be indispensable.

My present purpose is to point out that in common practice this kind of cooperation has not gone far enough that the highest efficiency in medical and surgical work and the best results attainable may be reached only after there has been a union formed between all of the hospitals in any given community for the promotion of the common good.

The most perfect organization of any particular hospital creates merely a perfect unit while the greatest good to the greatest number of hospitals physicians and patients can come only from a combination of all for the good of all.

That such cooperation among the hospitals of any community could be made the means through which the efficiency and economy

of their administration would be promoted is certain. Through a comparison of methods a discussion of ways and means and a standardization of practice in many particulars simplicity and economy and better results would come.

That the advantages of collective bargaining as applied to hospital supplies food and furnishings alone would more than repay such cooperation has been shown by the New York Bureau of Standards and Supplies through which many of the large eastern hospitals are provided with those things they require at jobbers prices. What we as surgeons are more directly interested in however is the benefit that could be made to accrue to the cause of better surgery and better surgeons. The welfare and well being of all surgical patients could be promoted and the results of surgery and the credit standing of surgeons and hospitals alike could be improved.

In my address as President of the Colorado State Medical Society in 1906 this matter was referred to and the suggestion was made that a board of Hospital Councilors be created by appointing two or three medical representatives from each hospital in a city to form such a council.

Many important matters might properly come before such a composite body for consideration. Some of these questions are related to certain hospital abuses with which you are all familiar. They are peculiar to no single locality and characteristic of no particular hospital. It is humiliating to confess that they are more or less general and universal and it is undeniably evident that nothing short of municipal state and national hospital cooperation and standardization will eliminate them.

You will have anticipated that I refer to the total inadequacy of preparation of many of those who apire to do and who actually do major surgery under the protection of our

open hospital to those whose commercial and surgical justification are so interwoven that any surgical judgment they might otherwise possess is overmastered by the minor for operating and the consideration of the share of the fee to be paid to the operator and worst of all to those few who use the hospitals to cover the criminal practices of their offices or the offices of others with whom they are associated. Open hospitals governed and controlled by laymen in the management of which the medical and surgical staff if one exists has little or no voice are everywhere in this country guilty of one or more of these offenses.

One occasionally hears whispered about among doctors or nurses the details of some surgical atrocity committed by some untrained or incompetent operator who should not be admitted to practice surgery under the protection and implied guarantee of any hospital. Without skill, experience or training for a sufficient period under a competent surgeon without sufficient knowledge of surgical pathology or of surgical diagnosis he is allowed to enter patient into any hospital and untrained and unrestrained he attempts the most delicate and difficult operations hoping that he may be able by the grace of God to get away with it. The results you all know.

I am with all the advantages of the best trained and most skillful mind and hand with the last word in modern scientific surgery fresh in his memory the most capable surgeon with the highest and best of motives and a conservatism which considers nothing but the welfare of the patient feels his limitation and fears failure.

I look for him where angels fear to tread and nothing short of a general medical board of control for all the hospitals in every community with full authority to say who may and who may not operate in such hospital will ever protect the hospital and the people against such operators or protect such operators against themselves.

Some one has well said that the tragedy of today is not the tragedy of the criminal but of the incompetent and not of the absolutely incompetent but of the relatively in-

competent. It is the tragedy of who has the best intentions and character and a fair equipment for but who has not a thorough equipment who cannot do the thing he starts the best possible way. Society with half equipped workers with women who are honest and earnest incapable but who are not up to of the very best work.

When surgical ambitions are in an individual with the necessary ness and indifference to the welfare of the patient and a longing for at least a fee to be got by operating the way to come for the patient.

Surgical conscientiousness diagnosed upon an adequate knowledge of surgical pathology a conservatism based in the resting and recuperative of the human economy and to know to operate and not to use force and better qualifications for a surgeon: finest dexterity and technical skill of spectacular operator on earth.

Among other desirable ends to be by coordination is the adoption of a system of hospital accounting and The Tulsa Tuliha County Medical appointed a Committee on Hospital efficiency which made a most interesting report to the Society at its October 21, 1914 in which they rec that the County Medical Society following steps with a view to accomplishing this purpose:

1. Prepare and maintain a system of morbidity and statistics based on the International System of Disease and Classification and a constitution to a hospital system with such as may be suggested by the needs of the hospital.

2. Urge each hospital to perfect its medical record so that they will only require information for the following:

3. Urge each hospital to keep an accurate record of the condition of patient at the time of discharge and to provide for an accurate rate of patient after discharge.

4. Urge each hospital to put in operation a plan for obtaining the information required to each discharge patient in the following ways: (a) By writing at stated to the patient his own name one of his

who has a permanent address (b) By sending a representative of the hospital at stated intervals to interview the patient or his physician (c) By taking whatever steps may be necessary to insure the return of the patient to the hospital at the proper time for further examination and in some cases for treatment

Regarding such higher hospital efficiency the Committee further reports

Your Committee believes that it would be of great assistance in paving the way for the proposed local study if some organization with adequate resources at its command would first make a preliminary study of the entire hospital situation in the United States and would define standards by which to measure the efficiency of a hospital. Such a report would provide your Committee and the efficiency committee in each hospital in Philadelphia with a working plan for accomplishing the purpose for which they were appointed.

We therefore recommend that the County Medical Society endorse the request which the American Medical Association the Clinical Congress of Surgeons of North America and the American Hospital Association have forwarded to the Carnegie Foundation asking that the Foundation prepare a report on the classification and standardization of hospitals—a report that will perform as great a service for the hospital of this country as the Report on Medical Education has already performed for the medical school.

The promotion of hospital efficiency and standardization the elevation of hospital moral and the exclusion of the unfit and the incompetent from hospital practice has now become a matter of paramount necessity because of the importance of the hospital in the present scheme of medical education.

The hospital is now deemed as essential to the two last years of modern medical teaching as the laboratories are to the first two years and here also the coordination of these two promotes the efficiency of both.

The work of an institution in which there is no teaching is rarely first class. There is not that keen interest nor the thorough study of the cases nor amid the exigencies of the busy life is the hospital physician able to escape clinical slovenliness unless he teaches and in turn is taught by assistants and students. It is I think safe to say that in a hospital with students in the wards the patients are more carefully looked after their diseases more fully studied and fewer mistakes are made. The objection often raised that patients do not like to have students in the wards is entirely falsified. In my experience it is just the reverse.

Though it may seem to be somewhat inconsistent with my strictures and criticism of American hospital management in some of its phases I desire to pay a tribute to the splendid achievements of modern scientific surgery and the general excellence of surgical results everywhere in this country even in many small communities. I am sure we all believe however that these results could be improved and would be better if such evils as are here referred to could be eliminated through an efficient system of coordination and standardization of our hospitals. So also the individual surgeon would become a better trained and safer surgeon if he were obliged to qualify for admission to hospital practice by meeting certain standardized surgical requirements before such privileges were accorded him.

Notwithstanding the ultimate success and high attainments of many self made surgeons the general average could be vastly improved by better hospital organization in the same way that the present requirements for a medical degree have improved the output of the medical school through the demand for higher educational requirements for admission.

We must as a matter of course appreciate that the regulation and standardization of the hospitals of this country would present even greater difficulties than were confronted in the standardization of the medical schools but these difficulties are not insuperable and may be overcome in time if the attempts of the American College of Surgeons and other allied surgical associations are endorsed and sustained as they should be.

In support of the efforts of the American Medical Association the Clinical Congress of Surgeons of North America the American College of Surgeons and the Philadelphia County Medical Society may I be permitted to suggest the propriety of the Western Surgical Association giving this movement consideration and such support as a representative committee may see fit to recommend?

NOTE.—In accordance with the above suggestion committee as appointed to cooperate with similar committees from other medical and surgical bodies to promote the standardization of hospitals and surgeons.

SYMPOSIUM ON MILITARY SURGERY AT AMERICAN AMBULANCE UNITITY-SUR-SPINI FRANCE

UNDER AUSPICES OF THE LAKESIDE UNIT OF WESTERN RESERVE UNIVERSITY
CONVENTION

DR. W. C. CHASE, M.D., FAC.S., CLEVELAND, OHIO
DR. ALBERT W. CHASE, M.D., LONDON
DR. ALBERT W. CHASE, M.D., LONDON
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On February 5th last the Lakeside Unit of the Western Reserve University in charge of a service of the American Ambulance at Neuilly-sur-Seine France arranged an impromptu day in which the services of Drs. Du Bouchet, Blake and Mignot of the American Ambulance, Dr. Axel Carrel, Prof. Tuller, Sir Almonroth Wright and Sir Berkeley Myntman as guests together with members of our staff participated.

The hours of the morning and early afternoon were occupied by an inspection of the

Ambulance, a visit to the dental operations by Drs. Du Bouchet, Mignot. Later in the afternoon the papers were read.

The symposium on military surgery reported by a stenographer but the have not been read in any of the papers. It is a pamphlet thereof the error may have been made transcription of the stenographer and in the translation of the address Dr. Carrel and Dr. Tuller who speak French.

THE ACTIVATION OF A NATION

By GLOUCESTER W. CHASE, M.D., FAC.S., CLEVELAND, OHIO

Let me first of all state that it is not my purpose to consider here either the ethical or the political aspects of the invasion of Belgium but rather to present a scientific study of the physical effects of that invasion upon the Belgian people.

Then here we have evidence to show that the essential adaptive part of man and of animals is a kinetic system which is driven by stimuli from the internal and the external environment. As a result of this driving energy is transformed into either muscular action or chemical changes are produced. We have shown that the emotions are activations of the kinetic system without muscular action and also that the kinetic system may be driven by foreign proteins such as infectious producing locally. The organs of the kinetic system are the brain, the adrenal, the thyroid, the liver and the muscles, and we have shown that identical changes are produced in these organs by every

living stimulus whether exertion, anger, injury, worry, grief, excitement, foreign protein. We have shown that result of excessive activation certain are physically altered and that many cells are permanently lost. We have shown that under overwhelming activation the kinetic system by injury by emotion, exertion the alkalinity of the blood is raised. We have pointed out that activations singly or in combination cause death from acute exhaustion because such excessive physical demands on the more tissues of organs as the heart, the liver, such as cardiovascular disease, diabetes, Bright's disease, neurasthenia, and permanent physical effects. In the light of these findings it is stupor phenomena exhibited by the Belgian people. In comparison we will state that as in our experiment on animal bears mind that our experiment on animals

came to no such extreme as was the vivisection of the Belgians

German strategy required the submission of the Belgian people To this end they subjected the Belgian people to excessive activation Accordingly the kinetic systems of the Belgians were activated by contact and distance ceptor stimuli The contact ceptors were stimulated by shooting by physical assault and by concussion with bombs The stimulation of the distance ceptors was made by threatening aircraft by Uhlans by the shooting and torture of friends and of relatives, by the destruction or confiscation of their possessions by the levying of burden some fines by the separation of families by the loss of their treasures their art their institutions of learning As this activation was continuous the strain upon the kinetic organs of the Belgians could not be relieved by adequate sleep Later on when they were driven from their own land the activation of constant homesickness was added This gigantic experiment was applied to millions of people while our experiments on animals numbered only a few hundred The activation of the Belgians was continued during the night as well as during the day and was protracted for weeks and months—in fact it will continue for years—while our experiments on dogs lasted for a few hours only The subjects of our experiments had but a few simple activating mechanisms The Belgians had the great human endowment of highly developed mechanisms driven by a highly organized sensitive brain All of our animals were anesthetized and the period of their activation was promptly ended by death from anesthesia The Belgian people were denied the solace of painless death and the activation continued and is continuing in its slow and natural course Therefore in numbers in intensity in duration in completeness the kinetic activation of the Belgians is on a vast scale

If our observations and conclusions are correct, then the following should be approximately the immediate and the remote results of the vivisection of the Belgians There would be immediately a mobilization of the energizing secretions and chemical

stores of their activating glands There would be hyperchromatism of the brain cells in creased circulation of blood in the thyroid gland and increased output of thyreo-iodine there would be an increased output of adrenalin and an increased output of glycogen by the liver As a consequence of this mobilization of the forces within the body which may be compared to the mobilization of the military forces of a nation the body would be at its maximum strength for fight or flight As a result of the supreme effort of flight or fight or its equivalent in emotion one would expect to find diminished alkalinity of the blood as a result of this increased H ion concentration of the blood there would be rapid respiration and pulse in creased urinary output and sweating As a result of the excessive emotion and exertion glycosuria casts and albumin would occur in an increasing number of individuals As a result of increased blood pressure and increased H ion concentration there would be cases of sudden heart failure From the increased adrenalin output and acidity many cases of miscarriage would result The inhibition of the digestive processes would cause constipation auto-intoxication and indigestion Individuals who already had diabetes would show marked increase of symptoms some individuals having Bright's disease would be driven to renal failure coma and death and certain cases of cardiovascular disease would result in apoplexy

Through intense activation the action patterns of the brain would be wholly disarranged The normal action patterns of the peaceful routine of family social and vocational relations—heretofore balanced and even—would be dispossessed by the intense activation of the action patterns of fight and flight

A certain degree of activation causes a lowering of the threshold to stimuli or *neurasthenia* overwhelming activation causes *insanably* rupture of blood vessels causes *paralysis* destruction of a great number of brain cells results in *permanent loss of efficiency*

As we have stated already the acute stage of activation—great exertion or emo-

tion—would cause increased H ion concentration i.e. acidity or decreased alkalinity. Acidity would activate the respiratory center would cause excessive sweating would activate the liver and the adrenals would cause inhibition of the cerebral cortex and thus diminish mental and muscular power it would likewise tend to cause Bright's disease and cardiovascular disease and would tend to aggravate or produce diabetes. The certain result would be a number of immediate deaths a number of later death many miscarriages many cases of insanity of Bright's disease and cardiovascular disease and of diabetes and an almost universal diminished efficiency. As a later result one would expect to find that the Belgian like animal in captivity were procreating more slowly and that the death rate of the population as a whole had increased.

The first impact would carry away those whose margins of safety are slender namely the aged and those having chronic diseases. As a result of the excessive transformation of energy and the want of rest and sleep one would expect to in weight. But as when in Graves' disease the kinetic system is

subjected to continuous excessive activation one would expect the victims to live years months and in consequence by so much shorten their lives. Then too as in Graves' disease one would expect that in a short time the forces would show that the whole population had added years to their ages.

As to the immediate result of the invasion of Belgium these results are already established for all observers have noted them among the Belgians there have been many sudden death many cases of apoplexy many crises of insanity of insomnia of neurasthenia of prostration and almost universally loss of spirit and impaired efficiency with a loss of hope and ambition.

Data on the occurrence of cardiovascular and Bright's disease and of diabetes are not yet available. That life will be shortened is obvious but to what extent cannot at present be determined. The crushing of hope ambition and happiness the impairment and destruction of life by this violence to an innocent people is patent. Belgium has endured the equivalent of a surgical operation without the protection of local or general anesthesia.

SCIENCE HAS DIRECTED THE ART OF KILLING WHY NOT OF SAVING

By ALAN CARRIE, M.D. F.A.C.S. NEW YORK

I have recently spent some days in exploring the hospitals at the front and I will speak to you of what I have seen there. When one sees the results of the war at the firing line or at a little distance from the front he is impressed by the high degree of efficiency to which the art of destroying has been developed. From the days of the arrow the lance the siber we have come after several centuries to the 75 with its extraordinary results. If however one studies as we have done the condition found in the field ambulance and hospitals he is led to ask if we surgeons have really progressed with a rapidity at all comparable with that of armament makers and engineers. In our round of inspection of the hospitals situated within a few kilometers of the firing line

although the service was very effective yet we were very much impressed by the frequent occurrence of gangrene suppuration and infections of all kind. It is very probable that the hospital of forty four years ago did not present an aspect very different from the hospital we have just inspected. We were told in some hospitals that many of the wounded who had fractures produced by projectiles had to undergo amputation in others that soldiers with injuries to the knee joints were subjected to amputation. We surgeons may well ask ourselves what advance has been made in the last forty years in the treatment of infected wound. We must admit that the progress has not been very great. In fact the only progress we can claim is the possibility of making incisions

without aggravating the condition of the patient but we have not yet succeeded in preventing or stopping infection in several forms of wounds. We are powerless to prevent gas-gangrene for it is impossible to sterilize the wounds.

Medical and surgical science then has done very little up to the present time for the treatment of the infected wounds of war which are always the most difficult to handle. What then can the medical science of today do to bring about an improvement in the methods of treating wounds?

In the first place the wounded should be brought to a place where they can be properly cared for as soon as possible after being wounded this would diminish the need for

amputations and would reduce the death rate. But that is not sufficient. No matter what is done with our present knowledge and skill it is impossible to prevent infection entirely. What is needed is to study the conditions and cases carefully in order to find new methods by which we may be able to handle these cases successfully. Old methods of treatment have proved ineffective and the only hope for the future is to find new methods. No doubt in our researches and study of these problems we shall arrive at different conclusions but no matter from what direction we approach the problems their solution will be found only by the combined labors of trained men working together to this end.

SCIENTIFIC CONTROL OF FIELD SERVICE

By SIR ALMROTH WRIGHT M.D. LONDON

I am not going to say anything about typhoid fever as I consider that the present condition of affairs in regard to this is satisfactory.

The most important question which meets us today pertains to the treatment of wounds and consequently to the bacteriology of wounds. I will try to be very brief but I have to go over a good deal of old ground before I can strike upon new material. This however is necessary by way of preparation. To begin with quite wrong ideas were current as to the species of microbes which would be found in this war. We thought that we should have chiefly to deal with the staphylococcus and streptococcus but we found an entirely different series of anaerobic microbes of which Welch's bacillus was one of the most common. The streptococcus was of course frequently met and remained behind when the wound was thoroughly well opened and aerobic conditions were established. Then the picture presented was not a very formidable one but there were also certain infections by the staphylococcus and streptococcus as well as by the bacillus proteus which were of a more serious nature.

In all cases the first attempt was to obtain

prophylactic treatment by means of antiseptics. The wound was opened up and strong antiseptics were introduced in order to kill the microbes. This method has been pretty completely tested by means of iodine and carbolic solutions etc. and it has been found that all of the microbes cannot be killed by these measures and that infection remains behind in short instead of a closed infected wound one has to deal with an open wound which is infected. I want to outline to you the main features of the treatment of these open wounds.

First of all drainage is established. Drainage in a surgical sense means the making of an exit for pus and discharges and stress has been laid upon the necessity of making an incision at the lowest possible place so that gravity may carry away discharges but when an incision is made at the lowest point there is still not a sufficient exit. It is no more effective than is the draining off of effluents from a hole made in the bottom of a cess-pit—to which deep wound incision may be compared. Wounds which are perfectly well drained may still go on discharging pus. Drainage therefore must be followed by lymph lavage and no surgeon will be con-

tented with his work if he does not follow out this practice. After opening wounds the practice is to put on fomentation this makes active hyperemia and causes lymph to pass out of the wound and thus we obtain lymph lavage. Bier suggested that in cases of carbuncle one should apply a negative pressure and draw out lymph by this means but this has a negative result. To my mind a more reasonable method is to use a hypertonic solution and I have suggested that a one-half per cent citrate of soda and a 5 per cent salt solution should be used to call forth lymph. In my opinion every wound after it has been surgically drained should be treated by lymph lavage as this seems by far the most effective method of treating wounds. If a wound can be opened and drained quickly and later lymph lavage is introduced practically all that is possible has been done to bring about antibacterial activity. It may so happen that the particular patient under treatment has not enough antibacterial substances of his own. In such cases the use of vaccines is required but they must be preceded by drainage and lymph lavage. In very favorable cases drainage and lymph lavage are in themselves sufficient to bring about clean healing but even in such cases these means are even more efficacious when combined with vaccines. The prophylactic vaccine administered should be fortified against Welch's bacillus and at a later stage the wound should be inoculated with a vaccine containing staphylococcus, streptococcus and bacillus proteus. The best treatment of wounds then is by drainage and lymph lavage the antibacterial power of which should be increased by the use of vaccines especially if the power of resistance of the blood is not sufficient.

I wish to speak also about the use of antiseptics. It is surprising to learn how frequently it occurs that patients whose wounds have been treated with antiseptics make no progress for weeks or months. Certainly the value of antiseptics needs further investigation. Lister's successes resulted from the prevention of the introduction of microbes into wounds and of their transference from one patient to another. The third use of

antiseptics however is their therapeutic employment in the wounds themselves. If you ask the doctor what is his object in washing out the wound with antiseptics, he will answer "There are a lot of microbes and I hope to diminish the number to a great extent by washing out the wound with an antiseptic than I should by the use of water alone." In other words he assumes that a smaller number of microbes are left behind in the wound by his antiseptic methods and that this is greatly to the benefit of the patient. Now that does not accord with a good deal of bacteriological experience. It can readily be seen that after 24 hours no advantage would result from the diminution of microbes a fact with which all surgical experience is in accordance which shows that no striking benefits have resulted from the introduction of antiseptics into wounds.

What ought one to do with a wound? Anybody will say "First establish permanent drainage and then dress it every two to three hours." We know by experience that drainage is good and that frequent dressing is good but let me tell you the result of certain investigations bearing upon this point. We endeavored to find out what would happen if we took the discharges from the wound and isolated the pus for examination. For this purpose we made a pu leech extensor, porized very easily by means of a small test tube to which a piece of rubber tubing has been attached. This apparatus can be made of any desired size and may be applied either to a surface treated with antiseptics or to a surface not so treated. One striking fact at once noticed was that even if the wound itself was purulent and contained a large number of microbes the fluid drawn up by the leech tube was perfectly clear and practically contained only the streptococcus. Inside the tube was a clear fluid with white corpuscles a fact which showed that the streptococcus can live and grow in the unaltered lymph and blood fluid of man.

The residual pus in the wound is really the enemy. If we add a trypsin to ordinary blood fluids they become good culture media.

Let me now suggest an explanation of these facts. We very commonly found that

when we made an inoculation of *perfringens* in the blood there was not one microbe which would produce septicæmia. If a microbe is to grow in the blood it must find its food ready made any antitryptic power in the blood stands in its way but if this opposition is reduced by the introduction it is easy for the microbe to propagate itself.

Vetchnikoff has said that immunity is a question of training the white blood corpuscles and that when properly trained they pick up microbes. He showed years ago that in an animal that is immune emigration occurs and an effectual phagocytosis is established. It is a matter of importance to study this emigration quantitatively. This may be studied experimentally by taking any blood clot and floating it in a fluid and then investigating it to discover what comes out of the clot. There may be difficulty in doing this for the reason that the clot consists of

fibrin and as a fibrin shrinks the fibrils may give way and thus hæmorrhage from the blood clot may occur.

Take the blood put it into a tube and centrifugalize it. Thus all the red blood cells will be carried to the bottom of the tube the other half being filled by fluid. Let that fluid portion clot and a red and white worm will be left. By this method a method of quantitative measurement it is possible to find out whether any particular fluid will promote or retard or prevent the emigration of the white blood corpuscles. We found that antiseptics interfered with rather than favored the natural immunity of injured tissue.

We believe that the most valuable treatment of wound is the establishment of lymph lavage by the use of hypertonic solutions by warm fomentations frequently changed by continuous lavage or immersion and by vaccination.

PRACTICAL PROBLEMS FROM THE VIEWPOINT OF A FIELD INSTRUCTOR

By PROF. THEODORE TULLIER, PARIS

When a wounded man falls on the battle field there enter into play two very important factors, viz. shock and infection and we seek to diminish both. Our great problem consists in removing the wounded as soon as possible to the hospital, thus to a large extent eliminating these two factors. The shock is not always the same. I have seen men with but light wounds suffer considerably from shock while I have seen others severely wounded who did not experience it at all. In one instance a man was brought to the ambulance with only a slight wound resulting from the explosion of a shell which was suffering from such acute shock that he was in almost a dying condition. Not only acute shock but chronic shock may exist even when no wound has been received. I recall the case of a soldier who suffered from intense shock for more than two weeks although he had not been wounded. This was due to the causes which Dr. Crile has just presented to us in such an interesting manner. To some extent anociæmia and anæmia explain the uræ-

mic which is manifested in the presence of pain and shock but in these cases we must also take into consideration the morale of the individual patient. The *état moral* is an especially important element when considering the disasters that have befallen the Belgian people.

A true infection at what moment does it appear? I think at the time of the first dressing. We have concluded that it occurs at the moment the man is wounded. The clothing of the soldier is naturally very soiled is covered with mud and germ. When the projectile passes through the clothing it carries the septic matters it has picked up into the deepest part of the wound. There is no infection immediately. The antiseptics we have at present are wholly inadequate they are very superficial. We must find a new antiseptic which will effectually penetrate the deepest part of the wound.

One of the most important questions we have to meet is the transportation of the wounded with the least possible delay to a

hospital where they may have the required attention. There is always a more or less prolonged interval after a man receives a wound before he can receive proper attention and sometimes a long delay in picking up the wounded from the field is unavoidable. I have seen two men—a German and a Frenchman—who lay together six days in the wood where they fell. On account of the constant artillery fire of the Germans it was impossible to enter this wood to rescue the wounded.

At present we have ambulances on the firing line *postes de secours* that pick up the wounded *who have fallen in the open spaces* and convey them to the nearest hospital. But we have no means for immediately transporting those who fall in the trenches. These men must wait until evening when under cover of darkness they are removed often on chairs as no ambulance can go to the trenches. In order to facilitate the transportation of the wounded from the trenches it is essential that we have very light automobiles and these we have not. It is necessary that we have a large number of these automobiles—two thousand are needed.

And this is not all. It is necessary that these automobiles should be placed in the hand of the commandant so that they may be properly distributed among the various divisions of the army and yet be under one central command.

It is absolutely necessary to control pain as far as it is possible. I have asked all surgeons to give an injection of morphia every evening. The wounded man must not suffer—he is in a state of shock. If during transportation he suffers great pain his resistance is diminished. Therefore it is necessary that during transportation he should be kept absolutely immobile.

All the very seriously wounded are left at the field hospitals—the rest are sent to base hospitals. While the work done in the field hospitals is admirable it is accomplished under absolutely deplorable conditions. The patients cannot have the rest and quiet which are so essential; there are always din and confusion and the accommodations are insufficient. After the battle of Dixmude 5,000 wounded were brought in and only

3,000 beds were available consequently only those with severe wounds of the head or the abdomen could remain. It was imperative to remove the others immediately.

How then shall this rapid transportation be best effected? What is the best means of transport? There are two ways at present—by railway and by boat. Much has been said against the practice of transporting the wounded in freight trains but it is impossible to do otherwise while so many wounded must be transported on one line because the other railways are used for transportation of troops. Because of this the wounded are often two, three and four days in the railway trains and often arrive at the base hospitals in a serious condition.

Transportation by boat is the best method because the men at once can be put to bed and made comfortable with surgeons at hand and everything that is needed. The wounded thus conveyed reach the hospital in better condition than those transported by train. Of course the journey by boat should not last too long and sea-sickness should be avoided. The crossing should be made as speedily as possible and in case of bad weather the trip should be deferred.

In conveying the wounded by train there are three conditions to be fulfilled. The trains should be properly heated and lighted, and the cars should communicate with each other for as a rule there is only one surgeon and he should be able to pass from car to car without being obliged to alight.

I do not advocate the performance of operations at the front. Of course in certain cases immediate operation are necessary but in all other cases before operations are attempted the wounded should be moved to hospitals located at some distance from the firing line. The patient will be more comfortable and in a better state of mind. In the hospital near the front the wounded are never in security. If the army advances, they are abandoned if it retreats they are captured by the enemy. In each field hospital it is essential that there should be a surgeon of the highest skill. The wounded are arriving every minute and it is of the utmost importance that an experienced sur-

geon be available to pronounce upon the gravity of the wounds—an inexperienced man will not answer such decisions can only be made by one who is high in his profession. Although the operations can often be per-

formed by an assistant it requires a skillful surgeon of experienced judgment to determine the necessity for and the nature of the operation. In this way only can needless amputations be avoided.

MILITARY SURGERY FROM THE VIEWPOINT OF A FIELD CONSULTANT

By SIR BERKELEY MOYNIHAN, M.S., F.R.C.S., LLEDS, ENGLAND

The chief points upon which I am going to touch concern the nature of wounds. First let me call your attention to the fact that almost invariably wounds which come from the front arrive at the base hospitals in a septic condition. The only wounds which are not infected are those resembling the wounds so frequently seen in the war in South Africa, namely those which have been dealt by rifle bullets. These are occasionally—only I am sorry to say *very* occasionally—seen now. The majority of wounds we see at Rouen are those inflicted by shrapnel and these are without exception of a septic nature. When first we had to attack these septic wounds at home we felt a certain resentment at receiving at this period of surgery such grievously septic wounds from the field of battle. It was not long before we realized that the circumstances alone rendered them septic and that the fault lay not with those in care of the wounded but with the conditions under which these wounds were inflicted. We felt that since Lister had lived we should be able successfully to attack the wounds with the armamentarium at our disposal today but we were soon bitterly disappointed. We found that the treatment of these wounds by the kind of technique used for the comparatively trivial septic wound occurring in a civil population was utterly futile and without any value whatever. Since I came to France and have seen the conditions under which wounds are treated I have arrived at one fairly confident conclusion and that is that any antiseptic be it carbolic acid, iodine, what not is almost without any value whatever. I doubt whether it is of more value to use antiseptics than it is to use ordinary water. In fact I

believe that before the war is over we shall have changed entirely our method of attacking these wounds.

You will find that wounds are still dressed everywhere when the dressings are removed there is a wave of objectionable odor and sometimes the dressings are stained with discharges. The patient has in effect been poulticed with the most septic material one could find—the dressings ordinarily applied around the wounds are but putrefactive poultices. As far as our experience goes the wounds which do best are either those treated by constant irrigation or better still by immersion. If it is impossible to immerse the wound in water it can be immersed in air the limb being laid quite bare. Among the most troublesome wounds are those involving the knee-joint. I quite admit that there is a considerable difference in opinion at home with regard to the results in cases of this kind. It is certain however that it is absolutely necessary to drain the average case thoroughly. It is almost the rarest exception to see a knee joint infection attacked in the proper way. Knee joints are frequently drained by a tube on one or two sides or across the joint. One must bear in mind that the knee joint from the standpoint of the surgeon consists of three joints in one. It is absolutely impossible to drain a knee joint from the front—it is difficult enough to drain it from the back. In draining the anteroposterior cavity of the joint it is necessary to have a tube incapable of compression so that metal tubes are best. Use therefore metal tubes anteroposteriorly putting one into the knee-joint and then immerse the knee. To do this it may even be necessary to place the whole patient in a

hospital where they may have the required attention. There is always a more or less prolonged interval after a man receives a wound before he can receive proper attention and sometimes a long delay in picking up the wounded from the field is unavoidable. I have seen two men—a German and a French man—who lay together six days in the wood where they fell. On account of the constant artillery fire of the Germans it was impossible to enter the wood to rescue the wounded.

At present we have ambulances on the firing line *postes de secours* that pick up the wounded who have fallen in the open spaces and convey them to the nearest hospital. But we have no means for immediately transporting those who fall in the trenches. These men must wait until evening, when under cover of darkness they are removed often on chairs, as no ambulance can go to the trenches. In order to facilitate the transportation of the wounded from the trenches it is essential that we have very light and mobile, and these we have not. It is necessary that we have a large number of these automobiles, two thousand are needed.

And this is not all. It is necessary that these automobiles should be placed in the hands of the commandant so that they may be properly distributed among the various divisions of the army and yet be under one central command.

It is absolutely necessary to control pain as far as it is possible. I have asked all surgeons to give an injection of morphia every evening. The wounded man must not suffer—he is in a state of shock. If during transportation he suffers great pain his resistance is diminished. Therefore it is necessary that during transportation he should be kept absolutely immobile.

All the very seriously wounded are left at the field hospitals; the rest are sent to base hospitals. While the work done in the field hospitals is admirable it is accomplished under absolutely deplorable conditions. The patients cannot have the rest and quiet which are so essential; there are always din and confusion, and the accommodations are insufficient. After the battle of Dixmude 5,000 wounded were brought in and only

3,000 beds were available; consequently only those with severe wounds of the head or the abdomen could remain. It was imperative to remove the others immediately.

How then shall this rapid transportation be best effected? What is the best means of transport? There are two ways at present—by railway and by boat. Much has been said again of the practice of transporting the wounded in freight trains but it is impossible to do otherwise while so many wounded must be transported on one line because the other railways are used for transportation of troops. Because of this the wounded are often two, three and four days in the railway trains and often arrive at the base hospital in a serious condition.

Transportation by boat is the best method because the men at once can be put to bed and made comfortable with surgeons at hand and everything that is needed. The wounded thus conveyed reach the hospital in better condition than those transported by train. Of course the journey by boat should not last too long and sea sickness should be avoided. The crossing should be made as speedily as possible and in case of bad weather the trip should be deferred.

In conveying the wounded by train there are three conditions to be fulfilled. The trains should be properly heated and lighted and the cars should communicate with each other for as a rule there is only one surgeon and he should be able to pass from car to car without being obliged to alight.

I do not advocate the performance of operations at the front. Of course in certain cases immediate operations are necessary but in all other cases before operations are attempted the wounded should be moved to hospitals located at some distance from the firing line. The patient will be more comfortable and in a better state of mind. In the hospitals near the front the wounded are never in security. If the army advances they are abandoned; if it retreats they are captured by the enemy. In each field hospital it is essential that there should be a surgeon of the highest skill. The wounded are arriving every minute and it is of the utmost importance that an experienced sur-

geon be available to pronounce upon the gravity of the wounds—an inexperienced man will not answer such decisions can only be made by one who is high in his profession. Although the operations can often be per-

formed by an assistant it requires a skillful surgeon of experienced judgment to determine the necessity for and the nature of the operation. In this way only can needless amputations be avoided.

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By SIR BERKELEY MOYNIHAN, M.S., F.R.C.S., LONDON, ENGLAND

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bath. It does not matter a bit what is put into the bath as long as it is water. It is obvious that an antiseptic of any strength cannot be used since the patient is immersed up to his waist in the water. The change which comes over the knee-joint or wound of the leg as soon as drainage is established and constant immersion is started is really very dramatic.

If you are going to dress the wound the only thing which is of any real value is the salt solution which Sir Almroth Wright introduced. Within a period of two or three days this produces the most profuse secretion or discharge of pus and the wound begins to look healthy. Therefore we should give up dressings. We should cover wounds with just a little lint or a little gauze and salt solution. The dressings are not dressings in the sense in which we have employed the word in civil practice but are a means by which noxious discharges are gathered round the wound and their escape prevented.

In conclusion I would like to say a few words in regard to frost bite. We have had about 1300 cases of frost bite. These cases do not compare accurately with the usual frost bite from sking. Frost bite in the sense in which we use the term is produced not only by cold but by pressure and damp also. By the time the patient reaches the base hospital the need is not so much of prophylaxis

or treatment but of comfort. As far as the local treatment is concerned it does not matter what is done. One comes across turpentine and lanolin enthusiasts and a variety of other measures are used but as far as the processes of healing in the limb are concerned nothing has much effect upon the rate of recovery. On the other hand one notices a strong desire on the part of the limb to recover itself. Above all therefore do not amputate on any account let the patient discharge the bits of limb himself. The only thing to do is to make the patient as comfortable as possible. One is told in the papers that frost bite is an exceedingly painful condition and certain changes in the limb do indeed take place but for the most part pain is due to the treatment which is adopted. Frost bitten feet should not be kept warm they should not be covered or if covered the covering should be as light as possible. Since we have left frost bitten feet uncovered we have not had to give the patients morphia. In the hospital patients are seen with their uncovered feet raised on two or three pillows. They may be quite bare or may have just a light covering but coolness and comfort always go together.

There is nothing original in these few remarks—I have but gathered posies from other men's flowers and the only thing I have done is to bind them together.

DEPARTMENT OF TECHNIQUE

TEN COMMANDMENTS FOR THE MILITARY SURGEON¹

By PROFESSOR FREIHERR VON EISELSBERG VIENNA AUSTRIA

1 The fresh wound must not be touched with the finger and no antiseptics must be applied to it. As soon as possible the fresh wound is covered with a piece of dressing without the wound or the tissues around it being washed or irrigated. This dressing should be of sterile white hygroscopic gauze — if possible prepared beforehand as an individual dressing. This sterile dressing is fastened with a bandage — if necessary with adhesive plaster or mastisol. Care should be exercised in using mull bandages for if they are applied a little bit too firmly they may cause constriction.

2 The treatment of primary hæmorrhage if local compression with dressings is not sufficient is to be accomplished with elastic bandages or Knebel's tourniquet. Hæmorrhage from large arterial trunks may be controlled by pressure with the finger wrapped if possible with sterile gauze. Hæmostasis with instruments (ligation) should be deferred so far as possible until a stationary hospital is reached.

3 The canal of the bullet should not be probed either with a sound or with the finger nor should it be tamponed with a piece of dressing even if it is sterile. This rule holds too in general for the later treatment of wound: the sound dressing forceps or finger can be introduced for the sake of orientation only immediately before or during the opening of a wound for suppuration.

4 Fractures should be immobilized by fixing both the neighboring joints. In the first dressing at the front it is not so important to produce accurate coaptation as to see that the bone fragments do not rub against each other or exert pressure upon neighboring soft parts. This fixation may be accomplished by means of a plaster dressing if the material is at hand and the physician is master of the technique. Generally he only applies splints. The Cramer wire splint in different sizes is an excellent splint for universal use. The fixation of the broken femur is the most difficult especially if the fracture is above

the middle as the ordinary Petit's boots are not adequate. For transportation I would recommend a modification of the Cramer splint which has two lateral wings to enclose the thigh and pelvis. In the final treatment of fractures the long bones especially the femur I use extension as much as possible and finally get the patient on his feet again by the use of plaster mull dressings.

5 The extraction of projectiles is a pressing operation only in very rare cases and even so ordinarily should only be performed when there is some special indication for it as when the bullet is causing serious symptoms or can be felt immediately under the skin. The desire of the patient to have the bullet removed should not influence the physician to remove it. The roentgen picture makes the diagnosis of the location of the bullet easier but should not lead the surgeon to perform an operation that is not indicated. It almost looks as if roentgenology had brought about dangerous attempts at extraction by which patients have been injured.

6 In all painful operations even painful changing of dressings where injection of morphine is not sufficient ether should be resorted to. Ether vapor and slight ether anaesthesia is not a dangerous procedure and local anaesthesia is often a failure especially in phlegmonous processes.

7 In suppuration the secretion should be emptied out by incision and counterincision along the dressing forceps introduced into the wound and then — always under anaesthesia — a drainage tube inserted. Tamponing of the opening should always be avoided. Changing a tampon and applying a fresh one is not only painful but directly injurious.

8 In every swelling that is at first diffuse and then gives the impression of an abscess and causes fever one should think of the possibility of an arterial hæmatoma — aneurism.

9 For the sake of maintaining asepsis at every stage in the treatment of wound the use of

¹ These commandments were passed by Professor von Eiselsberg in reply to a request for an article

on military surgery in the present volume of some phase of military surgery

They were sent to us in

strong rubber gloves that can be easily washed without any especial care is earnestly recommended.

To Extensive operations should as far as possible be put off until the hospital is reached where all aseptic precautions can be rigidly carried out and the patient can be kept for after care. In severe injuries of limbs extensive

suppuration, gas phlegmons, or threatened gangrene with septic fever amputation should not be too long delayed and the life of the patient endangered too much for the sake of preserving an injured limb.

The most important of these ten commandments is Dressings must be aseptic and military surgery as conservative as possible.

A CASE OF TEMPOROSPHENOIDAL ABSCESS DISCOVERED BY EXPLORATION THROUGH MULTIPLE SMALL INCISIONS IN THE DURA, DRAINED AND CURED

WITH REMARKS ON THE TECHNIQUE OF OPERATION FROM THE STANDPOINT OF THE OTOLOGIST¹

By JOHN RANDOLPH PAGE, M.D. F.A.C.S. NEW YORK

OWING to the long duration of this case it cannot be presented in detail so only the most important symptoms and observations will be reported together with the operative findings and technique.

On March 14, 1914, a young Turk, 3 years of age, with a history of no previous ear trouble complained of a pain in his left ear which began the morning of examination revealed cicatricial drum membrane with redness and swelling in its upper posterior quadrant and small amount of discharge. The canal Myringotomy was performed and twelve days later mastoidectomy by Dr. MacKenty revealed a sclerotic mastoid with necrosis and pus limited to the tympanic and yugular region. The impression obtained by the operator is that a radical mastoid operation would very likely be required later.

Post-operative recovery was uneventful until the fourth day when the temperature suddenly rose from 100.0 to 103.0°. During the next three days the patient passed from a condition of drowsiness, with occasional delirium to one of more or less stupor with marked rigidity of his neck. Slight Kernig was present. Lumbar puncture could not be obtained for he refused further operation and not until three weeks after the onset of this condition when he was fast becoming more stuporous and irrational was consent obtained from his relatives for another operation. The dura was then exposed by the trephine at the point suggested by Dr. MacKenty and a 3 cm. more 1 diameter was found covered with foul granulations extending over the temporosphenoidal lobe forward and upward from the tegmen tympani. Marked relief was afforded by this operation; the temperature at once subsided; the patient's mental condition cleared and all signs of meningitis disappeared for two days. Then without return of the stupor the temperature rose to 103.0 and he complained of intense headache. Through an interpreter it was found that a partial aphasia existed. There was also paresis of his right arm and the right side of his face. Abdominal reflexes on the right side were absent. His sky negative. The temperature occasionally rose to 104.0 or 105.0 and

pulse varied between 80 and 120. Lumbar puncture was advised by Dr. Sharpe who also suggested further exploration of the dural surface but strongly advised against opening the dura for exploration through the old wound. I expressed some doubt as to the advisability of lumbar puncture here temporosphenoidal abscess was suspected for fear that the reduction of pressure in the ventricles might favor rupture of the abscess to one of them.

With Dr. MacKenty and Dr. Fulkner present, another exploration of the dura was made more bone was removed and the exposure extended in all directions without any further extension being found on its surface. Following Dr. Sharpe's suggestion lumbar puncture was performed before this exposure was made and about 50 cc. of cerebrospinal fluid was withdrawn. There was such marked reduction of the intracranial pressure after this had been done that while exploration of the temporosphenoidal lobe for abscess had been contemplated it as now banished for the negative pressure seemed to contraindicate the presence of an abscess large enough to have caused the symptoms, and I did not think the chance of finding an abscess at that time warranted the danger of infecting the meninges through incision of the dura. Marked improvement followed this operation; his mental condition again cleared, and the headache and temperature subsided. The paralysis, however, appeared more marked; the face and right arm. There was distinct paresis of the right side, almost total in the right arm, less marked in the right leg. Abdominal reflexes were absent on the right side also. The eye grounds were normal. The cerebrospinal fluid was slightly cloudy but showed no growth of bacteria on culture and the Wassermann was negative. There was no further rise in temperature above 100° and the pulse varied between 70 and 100. On May 13, 1915 (eighteen days after this lumbar puncture and further exploration of the dura) the following report was made by Dr. Foster Kennedy. The patient has right hemiplegia paralysis being most marked in his right arm optic disks clear no evidence of raised pressure at the present time. Apparently considerable aphasia present temperature seems to have fallen for the moment inadvisable to do anything more radically at present.

After the middle of May his hemiplegia and general

condition gradually improved and the left of My he was out of bed and seemed to be on the road to recovery. By the middle of June he was walking around the hospital with no aphasia no pain, and able to use his right arm although the hemiparesis was still evident.

I was now doubtful of his having had a brain abscess and thought very probably his symptoms had been due to a localized meningitis and entered his from the epidural abscess found at the second operation and I rather congratulated myself that the negative intracranial pressure resulting from the lumbar puncture had indicated me not to explore his brain. Dr Sharpe however still maintained that a brain abscess was present which would or later would cause trouble and that proved to be the case, for on the night of June 16 the patient could not sleep because of the great pain in his head. The following day he vomited four times. On the 8th note was made that the patient complained of pain in the back of his neck as well as lumbar puncture performed on June 15 resulted in a dark, straw colored fluid but no bacteria, however smear or culture. Lenticular present copper reduced in present Wassermann negative. The patient was drowsy and frequently nauseated. His temperature remained between 98° and 99° pulse between 60 and 70 and had occasional incontinence of stool and defecation. There was distinct weakness of the muscles on the right side still he occasionally got out of bed and went to the bathroom by himself and there was no Babinski and no Kernig.

On July 2 he was examined by Doctors Braun and Friesner and myself and at the time there was noted Babinski in his right foot. Examination otherwise revealed no focal symptoms; that is as could be found out through an interpreter there was no aphasia and no return of the definite paralysis of the arm etc. There had been previously however he had become tired and showed general muscular weakness. He apparently suffered severe pain in his head but when thoroughly aroused he could under effort walk straight with his closed mouth after the effort he would practice the collapse and would sometimes vomit. He could not be made to perform posturing test satisfactorily although when strongly encouraged to attempt them the impression given was that they were normal. Diadochokinesis (finger and wrist movements) seemed to be the same both hands possibly less on the right. Movement of both hands was equally sluggish and the general muscular weakness was marked.

On July 3 he was prepared for exploration of his temporaloparietal lobe. Owing to the previous operation the scalp as with difficulty separated from the bone. A large exposure, however, was obtained with the aid of a large middle ear canyons were curetted. Granulations not packed with gauze saturated with alcohol the wound being frequently washed with alcohol and salt solution. Iodine was applied followed by alcohol and salt solution. An incision was then made in the dura just over the tumor where it had collapsed. To the mass could be removed by a drachm of straw colored fluid escaped. (The introduction of the searcher. The instrument has been introduced upward for a distance of 5 cm. I then first thought that it might have entered the distended ventricle. To rule out other openings in the concentric line from the attic were made and explored without result. Then at a point after I found to be 5 mm above the line drawn from the lower margin of the orbit to the posterior occipital protuberance a distance of 3 mm in front of perpendicular drawn to the line through the middle of the tympanic membrane a large amount of straw amber colored fluid similar to that encountered at the first opening

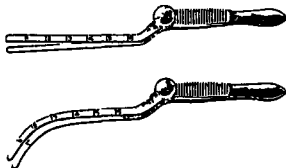


Fig. 1. Instruments used in exploration through small dural incisions. Fig. 2. Instrument used for exploration through Trautman's triangle.

escaped. This was followed by thick yellow pus and altogether the amount estimated to be from 6 drachms to ounces. The tubes which were obtained but they were unfortunately allowed to dry up and become united for examination. The slit in the dura through which the pus was located a hardly more than 4 mm long just large enough to admit the searcher with its arm in position. When the pus was located the searcher was left in position and the opening in the dura was enlarged to about 1 cm. After the evacuation of the abscess strips of cellulose tissue were introduced between the two arms of the searcher which had been allowed to spring open about distance. Mild improvement in mentation followed the operation. The patient's mental condition cleared in five days after the operation he was able to state that he had no pain in his head felt better every day and had no recollection of the day that had occurred during the three days preceding his operation. A week after the operation he had no pain and no Babinski. It was difficult to keep the cellulose dressing in place after the fifth day and at the end of a week the dressing was expelled spontaneously. Recovery was interrupted.

I was very fortunate in having good consultants whose frank discussion during the progress of the case was unusually interesting and instructive.

As all methods of operating for brain abscess are more or less open to criticism and as the one pursued in this case is no exception to the rule I wish to present certain points which to my mind justify its use in this case.

In a paper on brain abscess read before the Eastern Section of the Society last year Dr Sharpe (1) voicing the opinion of several others speaks of this method as the dangerous and unsurgical procedure of puncturing the dura 'blindly' with a needle in search of the abscess—because of the danger not only from meningitis but from medullary edema when the needle is used through a small opening in the infected area. As against this method he advocates exploration for temporoparietal abscess through a subtemporal decompression opening to avoid entrance through the infected field.

and increased danger of meningitis and medullary edema.

The question arises Does not the chance of finding the pathway of infection or stalk as Mr. Ballance calls it through which the abscess may be drained with comparative safety warrant the exploration through the mastoid and do not the advocates of the subtemporal route over estimate the danger of meningitis and medullary edema from systematic exploration through separate small incisions in the dura with a scarifier that does not add to the operation the danger of hemorrhage and which possibly does not produce the traumatism to the brain tissue and consequent edema that the more elaborate exposure and manipulation of the cortex does in the subtemporal operation? No doubt a subtemporal decompression lessens the danger from edema after it has occurred but it is a question whether the dangerous edema does not occur more frequently in exploration by this method than by the other.

In a case (2) reported several years ago pursuing Dr. Whiting's method of systematic exploration through small incisions at his direction I made between sixteen and twenty explorations through that number of different incisions in the dura with successful location of the abscess and recovery of the patient.

Judging from the literature on brain abscess the percentage of cases is not small in which the pathway of infection remains visible on exposure through the mastoid through which drainage may unquestionably be obtained with the greatest comparative safety. Certainly the percentage of such cases is not small enough to admit of its being entirely ignored in considering the route to be employed for exploration.

With regard to the danger of producing meningitis by small incisions in the dura contiguous to the mastoid wound considering first only the danger of infection from without it seems to me that this danger is comparatively slight great as it may appear at first thought for although the operation is close to or through a wound that is infected this wound is pretty thoroughly curetted of granulations down to the inner plate and its every crevice packed with gauze saturated with a strongly antiseptic solution before the dura through which the openings are to be made is uncovered. Freshly uncovered dura is certainly sterile provided it has been exposed with sterile instruments and has not been contaminated by the operator or his assistants. Granting that the exposed dura is momentarily contaminated by the surgeon's gloves, or instru-

ments the contamination does not have time to become established as an infection on its surface and before an incision is made other gloves are required for all hands another table of instruments and sponges are put in use and the recently exposed dura is then washed off with a strongly antiseptic solution followed by saline. In the case just reported the dura was wiped with a dry sponge and an iodine solution was applied for a moment. The wound was then flooded with alcohol followed by salt solution consequently any bacteria that rested on its surface during its ten or fifteen minutes exposure were well taken care of.

Where granulations cover the dura from prolonged epidural infection it is reasonable to maintain and experience has shown that the meninges beneath such an area are more resistant through adhesions to infection than are the meninges beneath normal dura and although the granulations may be so infiltrated with bacteria that even heroic treatment with anti-epileptics will not reach them all the added resistance of the meninges limits decidedly the chance of infection in such cases.

With separate small incisions the whole wound can be left open to allow free access to the area for drainage of the abscess and the dura can be protected with gauze. On the contrary a large opening in the dura necessitates the split muscle operation to prevent a fatal hernia the wound has to be closely sutured for the same reason which not only interferes with proper access to the abscess but also adds the dangerous possibility of confining infection over the large exposure of cortex. With this large exposure of cortex there is also to my mind increased danger of meningeal infection both from the draining abscess and from without as well.

The limited number of meningitis cases which develop after small incisions have been made in the dura exposed to infected mastoid wounds may be due to the possibility that with a small nick in the dura the pressure of the cortex around it causes a limiting adhesion to form before the contamination has time to become established as an infection and the larger the incision in the dura the less this pressure.

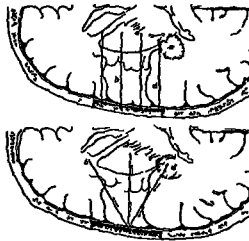
Dr. Cushing (3) is of the opinion that the route to be employed depends on the individual case although in cases of temporosphenoidal abscess he seems to think exploration through a subtemporal decompression before the mastoid is opened the safest procedure except in the initial or latent stages where the diagnosis may be in doubt and in cases of cerebellar abscess.

PAGE TEMPOROSPHEROIDAL ABSCESS DRAINED AND CURED

Dr Dench (4) expresses his appreciation of the importance of looking first for the avenue of infection through the mastoid wound and if possible draining the abscess along this route but says that in case an opening has to be made through normal dura he prefers to follow the decompression operation in the middle cranial fossa in case of suspected abscess above the tentorium and a similar decompression behind the lateral sinus where there are evidences of an abscess below the tentorium. In either case he exposes the dura over a considerable area and divides it with two incisions crossing each other at right angles. He then packs iodoform gauze between the dura and pia and waits from twelve to twenty four hours for adhesions to form to guard against meningeal infection and for the decompression area to favor progress of the deep-seated abscess to the surface. At the end of this time he explores through the incision in various directions with a director and if successful he carefully introduces along the director thin bladed forceps and retractors to evacuate the abscess and aid in the introduction of material for drainage.

Dr Harrison (5) shows in a diagram the possible danger of creating new pathways for infection where the brain is explored in various directions through the same small opening in the dura and the abscess is not located at the first puncture. When the cortex is exposed sufficiently by Dr Dench's method to enable a thorough exploration to the widest limits it presents to me practically the same disadvantages already mentioned that other decompression operations do.

In a series of 212 temporospheroidal abscesses operated on with recovery in 50.5 per cent (and 55 cerebellar abscesses with recovery in 52.5 per cent) reported by Kerner (6) good results were obtained where a fistula was found leading to the abscess but this was unusually rare in his series there being only 6 cases noted in the whole number (none in the cerebellar) while in Dr Dean's (7) report the avenue of infection was evident in 5 out of 21 cases and in Dr Dench's (4) it was evident in 9 out of 21. In Kerner's series the best results were obtained when the abscess was opened by the mastoid route and by direct trephining of the skull (84.6 per cent of the cases recovering from temporospheroidal abscesses 6.6 per cent from cerebellar). The next best results were obtained by opening through the mastoid route alone (58.8 per cent recovering from temporospheroidal abscesses 26.6 per cent from cerebellar). The next un-



Figs 2 and 3. Drawings from section of the skull showing schematically the advantages of exploration through separate incisions of the dura as compared with exploration by punctures in different directions. In the lower picture the most possible avenues of pus from an evacuated abscess are shown (from Dr Dench's (4) Harrison).

phining (41.4 per cent recovering from temporospheroidal abscesses 40.9 per cent from cerebellar).

Maier (8) in an article reporting 38 cases of cerebellar abscesses quotes both Kerner and Neumann and with them against the advisability of exploration through a decompression opening before mastoid operation has been performed. He advocates multiple punctures of the dura with a large canula until the pus is located and a wide incision down to the abscess. In the case of cerebellar abscesses he makes exploration through Trautman's triangle. When pus is found he makes a counter opening and the abscess is drained through the thinnest portion of the occipital bone.

Exploration with a narrow bladed knife advocated by many surgeons is to my mind extremely dangerous. The knife should be guarded as soon as incision in the dura is made and exploration should be made with an instrument less likely to cause hemorrhage. One used in this case I derived at the suggestion of Dr Farrington of Memphis and I have learned that Dr Dean of Iowa City has used a similar instrument for some time. Like Dr Cunningham's blunt pointed needle it graduated in centimeters for the convenience and safety.

As a material for drainage Dr Dean

non irritating in the brain and elsewhere in the body so my attention was directed to it for use in brain abscess. It can be formed into soft or rigid tubes and into the thinnest film which can be boiled and used as a protective tissue or for drainage.

The emphasis is laid by many writers on the importance of free drainage of the abscess after its location by puncture is apt to be taken too literally. It seems to me that the smallest incision through the brain substance compatible with drainage is the safest procedure as the faculty possessed by the brain through its pulsation of expelling substances along a small pathway to its surface may to some extent be relied on. If later signs of retention appear the moderate incision had better then be enlarged than at the first operation. Counter incision for drainage of an abscess in the temporo-sphenoidal lobe is seldom indicated but when it does become necessary it would seem wise to follow the method of first incising the dura and waiting for adhesions to form before penetrating the brain substance as immediate relief has already been afforded and the delay is not then dangerous.

Somewhat in support of this Mr Ballance (10) says: Drainage through the stalk would if successfully accomplished remove all urgent symptoms and obviate the tendency to death. In some cases no doubt such an opening would not be sufficient to effect a cure and the surgeon would be obliged to make a counter opening as he would in other parts of the body.

The introduction of the operator's finger into the brain for the purpose of locating the abscess as advocated by this author seems to me rarely justifiable other methods are less injurious.

Dr Dean (7) is of the opinion that where an opening in the dura is found through which pus

escapes it may be stretched but the dura should not be cut. This to me is sounder doctrine than is the free incision for free drainage. He also speaks of the danger of uncontrollable hernia where even a moderately large incision in the dura is so placed that it cannot receive proper muscular support. This agrees with my own observation but the danger of hernia is not often alluded to by other writers.

Unfortunately in most of the reports found the details of the operative procedure are not given but it seems that exploration in various directions through a large dural opening is the most usual procedure except in those cases where the pathway of infection is evident. It is for this reason that the method of exploration through separate small incisions is brought to your attention.

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A NEW POSITION FOR PROCTOSCOPIC EXAMINATIONS

BY HUGH CROSLF MD FACS EL PASO TEXAS

FOR several years the position illustrated in this article has been uniformly used by the author in making proctoscopic and sigmoidoscopic examinations in either sex as well as in treating the trigone of the bladder in the female.

The patient is placed face downward on an ordinary examining or operating table the leaf of the latter being dropped two chairs or stools padded with pillows or sheets to serve as a shoulder binding are placed so as to permit the head of the patient to pass easily between them the

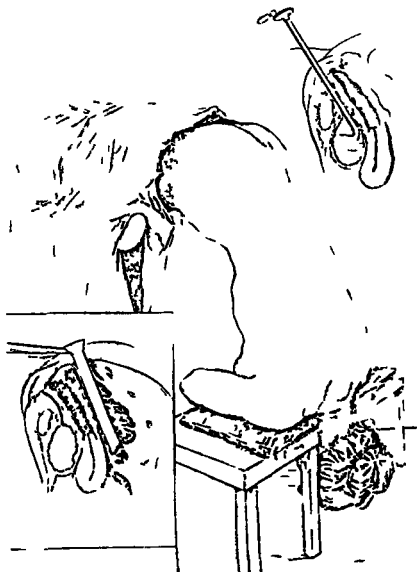


Fig. 1. Central station. Upper left. Upper right. Lower left. Lower right. Proctoscope passed. Bladder. Proctoscope passed. Bladder. Proctoscope passed. Bladder.

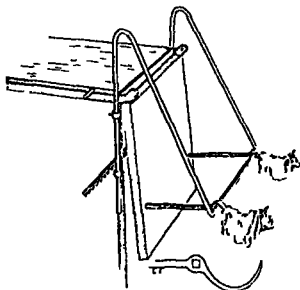


Fig. 1. A suggestion for shoulder supports to be shipped into offices of the leg holders on the ordinary examining table.

Shoulders being supported by the separated chairs or stools. While bending over the end of the table the patient is supported by the nurse or surgeon the torso clearing the table far enough to avoid pressure by its edge to the lower abdomen. Such pressure in bladder work will give a false picture and will also prevent free air in take in that structure. The moment the Swineburn male urethroscope, Kelly cystoscope, Tuttle or Kelly proctoscope or sigmoidoscope has passed the sphincters of the bladder or rectum the obturators are removed when a suction of air will occur ballooning the emptied bladder or bowel in a manner extremely gratifying to the examiner. By this means the trigone of the bladder and the

meatus of the ureters can be observed and if desired the ureters may be catheterized and the trigone treated in the female.

In either sex the rectum can be inspected and treated and the valves of Houston passed under observation. After the sigmoidoscope is inserted and the obturators removed the intruding air will dilate the rectum. Dip the handle of the sigmoidoscope well between the legs of the patient then advance the instrument, elevate and tip the handle in slow sequence to the left then to the right and advance when the upper sigmoid can be observed and passed and the true descending colon safely entered by the scope entirely under direct observation. The author has observed and demonstrated two-thirds of the descending colon with this position. The knee chest posture is difficult for the patient to maintain; the patient is easily forced out of position and the examiner has not the thighs of the patient for steadying his elbows nor the pace permitted for handy location of instrument as in the author's position which patients prefer to the knee chest posture.

Operation upon the lower rectum such as bowel slipping procedures secondary to removal of rectovesical recto-urethral fistula have been performed by the author with the patient in this position the anæsthetic being given as in the lying position for cerebral decompression work upon the skull.

The author finds this position in many ways more advantageous than the knee chest posture. Its point are very well demonstrated by the illustrations which were drawn by the author's artist Miss Emma Forster.

Cleansing enemas and preferably oil laxatives should be given several hours before examination. The author requests patient to take a cleansing enema two hours before examination and to have the stomach empty avoiding diaphragmatic pressure caused by a full stomach.

PROSTATIC SURGERY IN THE LIGHT OF RECENT PROGRESS

A NEW ERA IN PROSTATIC SURGERY EARLY OPERATION MODERN TECHNIQUE THE SUPRA-PUBIC VS THE PERINEAL ROUTE IMPROVED METHODS OF AFTER-TREATMENT THE QUESTION OF DRAINAGE INFLUENCE OF RECENT METHODS OF ANÆSTHESIA CONCLUSION

BY HORACE PACKARD M.D. F.A.C.S. BOSTON

Professor of Surgery Boston University School of Medicine Senior Surgeon Massachusetts Homœopathic Hospital

INTRODUCTION

IN the early days of appendicular surgery, all the cases were easily classified into those who died and those who didn't. The surgeon sometimes got an opportunity to see those who didn't die in the first week or ten days of the disease. By this time a bunch had formed in the right inguinal fossa which meant that the appendix had ruptured and a perianal abscess had formed. By this time it made little difference whether the surgeon got in his work or not for Nature had forestalled him and walled off the offending member and later brought about a more or less imperfect cure by evacuating the pus into the intestine or by sinus externally or by gradual absorption.

A striking parallel exists between the above portrayal and the history of the surgical beginnings in prostatic surgery, differing only as the anatomical relations and functions differ. In the first few years of the writer's experience in this branch of surgery, not a single case was seen but had either gone on to a condition so critical from obstruction and cystitis and their sequelæ that early fatality was assured with operation or without. Or if happily for the patient the obstruction had early become of such character that a catheter could not longer be passed, such a case sometimes fell into the hands of the surgeon before the vital forces were spent and while still the forces of Nature with the urgent help could repair the damage. Little by little, filtrate of common sense has permeated the medical press and the medical profession and through these channels finally the public. It sums the matter up in the simple terse way: Prostatic is obstruction pure and simple. Drugs are useless. The catheter is a dangerous expedient. Mustn't wait. Mustn't wait. Mustn't wait. All this has merged into

A NEW ERA IN PROSTATIC SURGERY

This new era in prostatic surgery has been brought about by one simple change viz. early operation. The campaign of education has

carried home to the general profession and the laity that the surgeon no matter how cleverly and quickly he may remove a prostate gland is powerless to dilate a contracted bladder. He may not eliminate a chronic cystitis and pyelitis; he cannot easily reduce a diverticulum. The success of prostatectomy must be measured therefore not only by the bare fact of a continuation of the patient's life but also by the conditions which accompany that continuity. If as a sequel of long obstructive prostatic enlargement concentric hypertrophy of the bladder wall has occurred to such an extent that the total capacity is but an ounce or two, the case cannot be recorded as a cure for the patient will still be tormented by day and by night with frequent calls to empty the bladder. Likewise if an atonic bladder be the sequel of long prostatic obstruction the urine accumulates as in a toneless cloaca and finally overflow when the intravesicular pressure exceeds the opposing force of the prostatic lobes. Furthermore chronic cystitis, a ure sequel of the catheter habit, is by no means certain of cure even after the most successful prostatectomy. How great therefore is the contrast in the after history of the prostate case who has the obstruction removed early before irremediable changes have occurred above the point of obstruction and the case which has been nursed along until operation is invoked as a last resort when not more than a half or a quarter cure can be expected.

It has been the gratifying experience of the writer in the past three or four years to find on looking over the record that the percentage of unforming cases which have appeared for operation has steadily diminished and the percentage of real and perfect cures (determined from bare facts of immediate recovery from operation) has steadily increased.

This result has been attained mainly as stated above because of earlier operation before the patient's vital forces are spent. Other factors have entered into the question and have undoubtedly exercised some influence. These are

- 1 Improved operative technique
- 2 Improved methods of after treatment
- 3 Improved methods of anaesthesia

Operative technique is after all is and an individual thing. Although surgical operations the world over are at the present time performed after the same general plan yet individual details vary and upon the details depend our definition of a masterly technique on the one hand or an indifferent or poor technique on the other. To one who has seen Freyer's technique of suprapubic prostatectomy at St. Peter's Hospital in London it seems the very acme of perfection because it is by the hand of a master. There is no hurry norish but every move counts. The suprapubic incision and entrance to the bladder is but a momentary affair. One forefinger follows at once deep into the bladder and the other into the rectum. A few turns and twists of the hand concerned in enucleation and the operation is done and the prostate delivered. A few moments massage of the floor of the bladder over and about the bed of the prostate and the introduction of a drain tube finishes it—all told an operation of five or six minutes.

Comparisons are perhaps invidious in a paper of this character but they are sometimes helpful in emphasizing points which have been overlooked. For example the use of scissors or an artificial finger nail are quite unnecessary for breaking a way through the bladder mucous membrane to start enucleation. In enucleating finger protected by a thin aseptic rubber glove can work as effectually and intelligently as a bare finger therefore the patient should be given this detail of protection against possible septic infection as he is given it in connection with the operative technique of any other wound inside or outside his body. In 90 per cent and more of operable cases a vertical line of cleavage or vulnerability is found at the anterior commissure of the prostatic collar (Fig 1) which opens up at once on introduction of the tip of the enucleating finger to the prostatic urethra. From this point of entrance the finger follows along the line of lateral cleavage between the sheath and capsule (Fig 2) with varying degree of ease according to the pathological conditions attendant upon the prostatic enlargement.

A case now and then is met of sclerosed prostate tough as a ring of tire rubber and with no demonstrable line of cleavage. Such cases are best managed by a large suprapubic incision the patient in the Trendelenburg position and free exposure of the cavity of the bladder by suitable retractors elevation of the prostate by

the finger of an assistant in the rectum and cutting away the sclerosed prostatic tissue with long handled sharp-pointed curved scissors, according to the necessities of the case presented.

PROSTATECTOMY BY SUPRAPUBIC OR PERINEAL ROUTE.

No argument is necessary on this question for it is fast settling itself. It is probably safe to say that 99 per cent of prostatectomies are at the present time operated by the suprapubic route. In England and all over the European Continent it is suprapubic. In the United States the persistence of a few individual surgeons in the exploitation of the perineal operation has temporarily stayed the tide of progress. The change from the perineal operation to the suprapubic is as positively in the line of progress as the change to the modern caesarean section from the old crude unsurgical Poro. Many arguments have appeared in the medical press in the recent past on this question and it is but a waste of time to repeat them. There are these important facts however which stand unrefuted in favor of the high operation.

In the long run the after condition of the patient is better as regards—

- 1 Ultimate perfect healing of the wound
- 2 Continence and control of the urinary flow
- 3 Preservation and safety of important adjacent anatomical structures (rectum perineal muscles membranous urethra, seminal ducts)

Lesser conditions in favor of the suprapubic operation are

a Operation quickly over—averaging not over eight or ten minutes—with correspondingly little shock to the patient.

b But little required in the way of anaesthesia and correspondingly little post anaesthetic disturbance.

c Easy control of hemorrhage through massage of the floor of the bladder.

d Accessibility of wound for after care and preservation of asepsis. (It has been the experience of the writer that female nurses are diffident about caring for perineal prostatectomy cases therefore the after care as far as hospital nursing is concerned falls largely into the hands of the orderly who at best is not trained for accurate careful skilful nursing.)

It is remarkable how effective is the simple expedient of massage of the floor of the bladder in the control of post-operative hemorrhage (Fig 3). It is difficult to explain except on the theory that it provokes contractions in the tissues surrounding the bed of the prostate thus

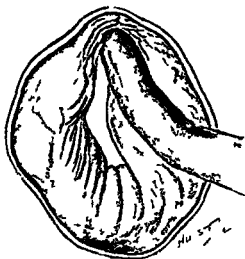


Fig. 1 Line of cleavage at the tenor commissure of prostatic collar and point of election for beginning suprapubic enucleation

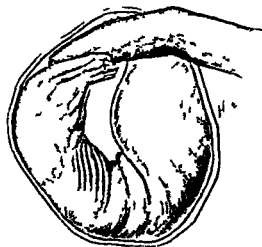


Fig. 2 The finger follows along the line of cleavage between the sheath and capsule

shutting up the prostatic veins arteries and capillaries. It is easily and quickly effected immediately after the prostate is delivered. A finger in the rectum presses the floor of the bladder upward for counter pressure while the forefinger of the other hand reaches down through the suprapubic wound and makes massage like pressure all about the periphery of the prostatic bed.

In clean suprapubic prostatectomy the after care is simple and uncomplicated in the extreme. After eighteen hours all tube drainage is discarded and no irrigation or washing of the bladder is needed or permitted thereafter. The patient is encouraged to get up and be about on the third day. Cases which are unclean at the time of operation from previous infection with the catheter must be cleaned up as far as possible prior to operation. In such cases the question of immediate and continuous irrigation and drainage must be decided by the condition attendant upon the individual case and the judgment of the surgeon. It appears to the writer that the simpler this can be arranged the better. It is surely more conducive to the convalescence of the patient if the product of septic infection planted in the bladder prior to operation can be washed away from the floor of the bladder as fast as it accumulates. If this be not effectively accomplished infective matter within the first few days following the operation enters the seminal duct tract and justifies

to the seminal vesicles and on to the testicles, and the embarrassing complication of an acute epididymitis delays the convalescence. Nothing has served so well as through and through irrigation and drainage as figured in illustration No. 4. It consists of a No. 18 soft rubber catheter passed into the urethra the eye end of which is tied to a long multiple drain tube which passes out of the suprapubic wound curving laterally over the patient and out to a bottle at the bedside. This simple scheme has proved more effective and easy of management than any other. By simple tube connection with an irrigating bag suspended at the foot of the bed a warm antiseptic irrigation fluid of permanganate of potash or boric acid can be kept flowing through the bladder as long as circumstances require.

INFLUENCE OF IMPROVED METHODS IN ANESTHESIA UPON CONVALESCENCE

Those whose experience dates back to the early days of prostatectomy can recall cases of post-anesthetic pneumonia serious enough in any case but doubly so in these men of advanced years and perhaps feeling general confinement. It also can be recalled cases of much prolonged suffering coming with all its debilitating effect.

A most gratifying change has come about in this respect since the adoption of gas and oxygen anesthesia and general anesthesia. Either of these methods wipes out at once all danger of post-anesthetic pneumonia. In nitrogen and oxygen anesthesia the patient awakes

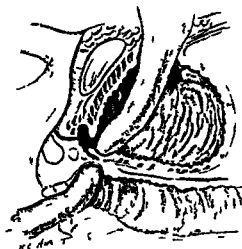


Fig 3 It is remarkable how effect the simple expedient of massage of the floor of the bladder the control of post-operative hemorrhage

before leaving the operating table and begins convalescence at once by taking an assimilating nutriment about as would occur if no operation had been performed. Practically the same course follows spinal anesthesia viz most gratifying and uncomplicated convalescence in comparison with the all too frequent distressing and anxious time which used to be the rule rather than the exception under old method. The course in anesthesia which now seems to yield the best result is

1 Preliminary (an hour before) hypodermic medication consisting of $\frac{1}{6}$ grain morphine and $\frac{1}{150}$ grain atropine

2 Preparation of the field of operation

3 Irrigation of the bladder which is filled to its full capacity and left full

4 When every detail is ready enough gas and oxygen are given to produce relaxation. For an easy and rapid operation relaxation is an absolute necessity. If this does not follow in a few seconds enough ether vapor is added to the gas and oxygen to secure it. The rest is easily and quickly done by the moves described earlier in this paper. This is a positive method of anesthesia sure to meet all cases and all emergencies and according to the writer experience and belief the best. If on the other hand spinal anesthesia has been selected while everything may go well in the majority of cases it now and then happens that it is not effective in producing the desired relaxation and general anesthesia

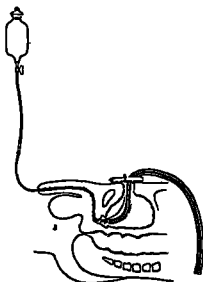


Fig 4 1 Irrigation to prevent displacement of catheter 2 Multiple drainage 3 Multiple drainage catheter 4 Irrigation bag

must be induced. Furthermore if the case turn out to be one which does not yield to finger evulsion a large suprapubic opening must be made and the Trendelenburg posture adopted. One hesitates to do this lest the anesthetizing fluid already in the spinal canal may gravitate to the dorsal and cervical region and produce embarrassing complication.

CONCLUSION

1 Prostatectomy under ideal conditions viz early operation and an aseptic bladder is an operation which ranks in safety and permanent and perfect cure with any of the established operations of surgery.

2 The suprapubic route offers advantages to the patient in perfect healing of the wound safety of a lycent anatomical structure and preservation of normal bladder function far in excess of the perineal route.

3 The suprapubic route offers to the surgeon and those concerned in the after care a better field for a rapid and efficient operation and control of hemorrhage better opportunity for maintenance of a clean wound and aseptic healing and better chance for irrigation and drainage if the case happens to be septic prior to operation.

4 Modern method of anesthesia (gas and oxygen or pinil) have removed many of the menacing complication of older method.

ORTHOPEDIC TECHNIQUE¹

By JAMES A. YOUNG, M.D., F.A.C.S., PHILADELPHIA

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IN orthopedic operations successful results are often entirely dependent upon the surgical technique employed and a brief reference to a special technique in a selected group of cases should be of interest and advantage to the general practitioner of medicine. Since the definition of orthopedic surgery includes the prevention and the mechanical and operative treatment of chronic and progressive deformities it logically follows that a large number of various chronic conditions come under the observation of the orthopedic surgeon.

In some localities and in some countries there is a tendency to limit the practice of orthopedic surgery to the treatment of congenital deformities and diseases of the spine, but the skill of the orthopedic surgeon has extended this restricted field and in a recent reference to the orthopedic clinic of the Massachusetts General Hospital Low² shows that the first grouping which included only spinal deformities, flat foot and rickets was extended to embrace eighteen different groups of chronic deformities among which may be mentioned tuberculosis of joints, deformities of chronic polyarthritis of infantile spinal paralysis and the deformities following old fractures and dislocations of joints.

In the older clinics, as at the Hospital of the University of Pennsylvania, where the orthopedic clinic has been established for thirty three years and at the Philadelphia Polyclinic established nearly as long a great variety of cases requiring orthopedic treatment has been observed. To accomplish satisfactory results it becomes incumbent on the operator to develop or invent new technique and the following cases illustrate the employment of special technique.

- I Total excision of the clavicle
- II Forceful reduction of dislocation of ilium
- III Early operation for psoas abscess
- IV Spina bifida: excision of the sac
- V New operation for recurrent dislocation of the shoulder
- VI Arthrotomy of the knee
- VII Anastomosis of the external and internal popliteal nerves for infantile spinal palsy

I. TOTAL EXCISION OF THE CLAVICLE

The following interesting case was operated upon at the Polyclinic Hospital:

M. G. applied for treatment for osteomyelitis of both clavicles. The disease began as an osteomyelitis of the inferior maxilla followed by the same disease in the left jaw and left knee. Examination showed the left clavicle bare for about 5 cm (2 inches) and around this was a granulating surface. The wound was profusely discharging. The laboratory findings showed the presence of taphylozoa at the right sternoclavicular junction there was abscess about the site of walnut. The roentgenogram revealed the presence of necrotic bone in the clavicular region.

The clavicle was then removed. The incision was made on the proximal and distal ends and after grasping the bone with forceps it was dissected free with an Albee's retractor and removed. The jagged condition of the distal end. The periosteum greatly thickened and it was carefully preserved. The dissection after removal brought the space a left hand glenohumeral joint. This gently retracted and pricked with a needle. There are two abscesses over the right clavicle. The incision was reopened and the pus allowed to escape. I removed the taphylozoa. The cavity was curetted, packed and a dry dressing applied. Continuous drainage was inserted and the periosteum brought together except in the site with catgut sutures. The wound closed without a wound. Regeneration occurred and complete healing has been reproduced. The perfect function.

II. FORCEFUL REDUCTION OF DISLOCATION OF THE ILIUM

Forceful reduction of a dislocation of the ilium is well illustrated in the following case:

H. M. G. 6 carpal ter by a patient. I mildly hurt my right foot for several days. He applied for treatment November 9 and I did the treatment. He had then been treated for six months (1 year and 11 months). He offered the statement that his reaching for his right hip. He experienced severe pain in the lumbar region. He later extended down his leg. For ten days he was treated by a hematoma. He suffered from sleepless nights. He had three hours of sleep. Upon examination he complained of pain in the right sacro-lumbar synchondrosis extending to the right calf. The right portion of the ilium on the right side front prominent. The posterior superior superior process on the right side depressed on the right lumbar spine was acutely fixed to the right with compensatory left curve. The roentgen photograph by Dr. Charles Lester Leonard showed separation of the pubis with some displacement between the last lumbar vertebra and the sacrum with fixation of the ilium and



Fig. 1 Displacement of ilium before operation

The patient prepared for operation with Buck extension applied to the left leg for ten days. He placed on his right and under ether anesthesia (not with the assistance of Dr. M. Behrend) he referred the case to me; the trunk was fixed and strong traction made downward and forward while under the anesthetic. A plaster of Paris cast applied and he returned to bed and leg extension was continued for ten days. He left the hospital with the deformity corrected, wearing spine brace (Figs. 3 and 4).

The deformity has remained corrected. The photograph and X-ray reproduction illustrate fully the displacement and correction.

This is not an isolated instance as five similar deformities have come under my observation.

III. EARLY OPERATION FOR Psoas Abscess

In operating for psoas abscess I employ a modification of the method as advocated by Treves. I employ the same incision as recommended by him that is a vertical cut of about six cm. (2½ inches) is made in the loin whose center is midway between the lower border of the last rib and the iliac crest about six or eight cm. (2½ to 3 inches) from the spinous processes of the vertebrae. The incision includes skin and superficial fascia and exposes the dense aponeurosis investing the erector spinae muscles. This is divided at its external margin while a retractor is made to push the muscle inward. The anterior layer of the sheath covering the erector pinnae



Fig. 2 X-ray photograph of displacement of the ilium.

muscles next incised bringing the quadratus lumborum muscle into view. So far I follow the method of Treves. At this point Treves divides the quadratus lumborum as close as possible to the transverse processes the incision being made to the full extent of the skin incision. In my method I employ the transverse processes as a guide to safety. Instead of dividing the quadratus lumborum until the muscle is divided to the full extent of the skin wound I insert an Allis blunt dissector into the fibers of the quadratus to the outer side of the extremity of the transverse process of the third lumbar vertebra separating them sufficiently to expose the psoas muscle thus avoiding the wounding of the abdominal branches of the lumbar arteries. An interesting case is the following:

L. M. age 1 month history for tuberculosis as negative. The mother noticed that the child was better for the right side and that day later he complained of pain in the hip and this reoccurred frequently. The child admitted to a visit to the children ward of the Polytechnic Hospital with leucocytocount of 8000 temperature 38° pulse 20 respiration 4. I found the right thigh fixed to the movement of the right hip joint, otherwise so normal there was no fullness in the iliac region but there was marked tenderness in the right iliac region with rigidity. Six days later the abscess as evacuated by posterior dissection through the iliac region the pus being removed five days later and the wound healed twelve days from

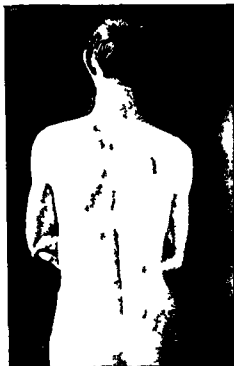


Fig 3 Displacement of ilium after forcible reduction

the time of operation. He was discharged next day wearing a plaster of Paris cast. To obtain the best result, early operation is a curative diagnosis in the case of the X's. If the operation is not performed early, the entire psoas muscle becomes filled with pus and this pus gets below Poupert's ligament drainage is difficult even when thorough and through drainage is established. The advantage of a early operation is more prompt and thorough recovery against the preferable cases of medical infection in the pelvis should be removed early to encourage prompt closure of the wound.

IV SPINA BIFIDA—EXCISION OF THE SAC

Joseph L. George was brought to the P. L. Clinic Hospital September 9, 1935. The child had been born by breech was small but well developed except for large sacral tumor over the sacro-lumbar region. Both lower extremities were feeble and there was present marked bilateral pes equinus. The child's children's legs were from 4 to 6 were ill normal mentally and physically. The tumor in the lumbar region had ruptured but not infected. The sac was protected and healed with antiseptic dressing. In March following the tumor was removed by dissection under special technique developed by the writer for this particular case. With the patient lying on his face he was suspended by his feet at an angle of 45°. Two fistulae were removed from the cyst and preserved in a jar for subsequent use should consolidation occur from excessive loss of spinal fluid. A large cystic mass tending to the second skin thus was dissected



Fig 4 X-ray photograph of displaced ilium forcibly reduced

up and the adherent part of the sac was included in the incision and removed. The flap of bone was used to close the opening. The opening was made about the size of a lead pencil. The opening was closed by through and through catgut sutures through its base and purse string catgut suture.

Before the final tying of the sutures one ounce of spinal fluid was thrown in to raise the proper tension on the coccyx. The large amount of spinal fluid lost. (The inverted position of the child placed in is the plan— to prevent the outflow of the spinal fluid and to allow of proper granulation when it should be rejected.)

A flap was made from the surrounding parts and the skin flaps brought together with silk worm suture. A rubber dam stretched over the child by collar below the line of incision to protect the wound from infection. The sac on the sutures was relieved by the application of broad strips of adhesive plaster placed over the gauze dressing. The patient was kept on his face for two weeks.

And in this position was nursed by the mother. The enemata administered every five hours to secure a free evacuation of the bowel and to avoid soiling of the dressings thus being the natural interval between stools for the child of this age. Spontaneous or voluntary action of the bowel was permitted. The twenty-four hours after operation the child became unconscious from severe convulsion. It appeared completely cyanosed and as greenish red hydrates per rectum. Primary neonatal secured the photograph shown was taken seven days after the operation. The child still lying on the spinal operation was entirely satisfactory but the paralysis of the legs continued. It seems orthopedic remedy that before operation the child's head had been increasing in size and the sac had become very thin so that it was threatened with spontaneous rupture and not that it was the excessively high mortality selected cases (87 per cent) the operation was undertaken.

THE TARNIER AXIS TRACTION RODS APPLIED TO THE SIMPSON OBSTETRIC FORCEPS

By FREDERICK C IRVING M D BOSTON

THE Simpson forceps presents several advantages. It has a correct cephalic and pelvic curve a simple lock which permits easy articulation and handles which approximate when the instrument is properly applied thus preventing serious pressure on the baby's head.

The system of traction rods on the Tarnier forceps has a generous perineal curve. Other devices with slight or no perineal curve must be carried so low when the operator attempts to make traction in the axis of the superior strait that the perineum is often torn and the rods contaminated by rubbing over the anus. Correct traction in the axis of the superior strait is impossible with absolutely straight rod as the axis itself if continued downward passes through the tip of the sacrum. The Tarnier traction device has three swivel joints operating in three planes of space. This gives the effect of a universal joint and permits the head to follow its own natural path during delivery. Rotation to the arch and extension at the proper time are allowed with as close an approach to nature as is possible with any instrument.

The first cut shows the Tarnier traction device as modified by the writer applied to the long Simpson forceps. In the second illustration are displayed the various parts of the instrument. The traction rod A A are two flat pieces of steel easily detachable for cleaning but at other times carried on the under surface of the shanks

of the forceps and held in place by knob-headed pins which impinge upon the inner margins of the shanks in exactly the same manner as on the forceps designed by Friedman. After the forceps are applied to the baby's head if the operator wishes to use the traction rods he releases them by gentle pressure upon the heads of the pins. Each flat rod is then inserted into the outer side of the Y shaped traction attachment B B which is slotted to receive it and so cut that it forms a double mortise joint. The diameter of the round arms of the Y piece is exactly the same as the greatest breadth of the traction rods entering them. Consequently the two tenons on each traction rod extend in their respective mortises through the arm to the inside. With the rods in place the tubular collars C C are pushed on until their ends impinge upon the shoulders which carry the knob headed retaining pins. Each collar is at all times prevented from slipping by a friction spring D. This makes a couple of such great strength and rigidity that the lower arm of the traction device from the wing rod at its end to the button which holds the rod to the eye of the blade is in effect one piece of metal.

The handle-lock E is from the Good forceps and the set screw F which prevents undue compression from the Elliott instrument. The photographs were made by Mr. L. S. Brown of the Massachusetts General Hospital.

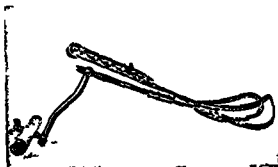


Fig 1 Forceps complete the modified Tarnier traction device applied to the long Simpson forceps

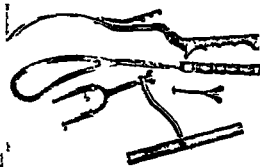


Fig 2 A A traction rod B B Y shaped traction attachment C C collars D friction spring E handle-lock F set screw

RESECTION OF THE BONE FOR PROTRUSION OF THE MANDIBLE¹

By THOMAS L. GILMER, M.D., Chicago

OPERATIONS for shortening the mandible have been successfully performed by Babcock of Philadelphia, Blair of St. Louis, Harsha of Chicago and others and to these surgeons I am indebted.

Protrusion of the mandible may be apparent or real. If there is lack of development antero-posteriorly of the maxilla then though the mandible be normal in length it may apparently be too long.

In the case I am presenting for your consideration there was over development of the mandible and an under development of the maxilla. On account of the under-development of the maxilla to have secured a more normal occlusion of the teeth it would have been necessary to have shortened the lower jaw to an extent which I believed would not have been justifiable since it would have destroyed the symmetry which should exist between the forehead, nose and chin.

In this case sections were removed on each side of the mandible at the angle. This site was chosen that I might with greater certainty be able to do a submucous operation there being a greater thickness of the overlying soft tissues in the oral cavity in this locality than farther forward. Opening into the oral cavity is of course to be avoided if possible. On the right side an incision at the lower border of the mandible one and one half inches in length was made through the soft tissues backward from the facial artery, the skin being drawn outward while the incision was being made in order that the scar might rest under the jaw in the shadow line. The soft

tissues overlying the periosteum were dissected upward on both the outer and inner surfaces of the mandible the periosteum being undisturbed in its relation to the bone. The bone on the opposite side of the jaw was exposed in the same manner. The soft tissues on the outer surface of the jaw with the parotid were retracted upward and backward those on the lingual side toward the median line. The size and shape of the segments of bone to be removed had been previously determined by Dr. Joseph Eisenstaedt by mathematical calculation. Two incisions were made in the bone with a circular saw, the cuts extending two thirds the distance from the base of the jaw at the angle upward, the distance between the incisions representing the shortening and change in the angle of the jaw desired. This operation was duplicated on the opposite side of the mandible. Since it is easier to drill the holes in the bone before its complete separation they were now drilled to receive the heavy immobilizing wires and the wires inserted in the holes. With rongeur and chisel the remaining uncut portion of the segments of the bone on each side were now removed.

Bands connected by bars had previously been cemented to the teeth on both sides, above and below by Dr. Eisenstaedt. The teeth were now occluded and held in occlusion by wires passing the lower to the upper bars. The end of the heavy wires previously passed through the bones were now twisted together, bent down, cut off and smoothed. This drew the end of the bones into close apposition. The soft parts were re-



Fig. 1. C. t. made before operation showing relation of mandible to maxilla.

Fig. 2. C. t. made after operation showing new relation of mandible to maxilla.



Fig. 3. Photograph before operation.



Fig. 4. Photograph after operation.

placed and properly sutured. A small drain of gutta serena type was placed in each wound and dressings applied. The upper incisor teeth were missing therefore a finger from me was light. The mandible was immobilized for six weeks when the fixation apparatus on the teeth was removed. The recovery was prompt and uneventful.

It is well known that function is restored after resection of the peripheral branches of the fifth nerve in the treatment of trigeminal neuralgia.

In experimental operation on dogs I have found that even when all of the third branch of the fifth nerve was removed from the inferior dental canal it was completely restored in a few months time and the pulp of the teeth showed no histological change. Therefore as time is an important factor in resection of the mandible no attempt was made in this case to save the mental nerve intact. It is less than five months since the operation was performed and nerve function is already practically restored.

THE SIMPLICITY OF BLOOD TRANSFUSION BY MEANS OF THE KIMPTON-BROWN TUBE¹

BY J. M. MASON, M.D., F.A.C.S., BIRMINGHAM, ALABAMA

SIMPLICITY should characterize all surgical procedures and is particularly demanded in operation which have to deal with emergencies.

In recent years the efficacy of blood transfusion has been abundantly proven and the surgical world cheerfully acknowledge its debt to Crile for his work in establishing this ancient therapeutic measure on a scientific practical and safe basis.

Transfusion has been performed by a number of different technical methods among which may be mentioned: First, contact of donor vessel of donor and recipient with or without mechanical aid after the manner of Carrl (1) and Horsley (2); second, contact and anastomosis by means of a cannula such as that of Crile, Ilberg or Sorensen; third, indirect anastomosis of vessel through the intervention of glass or metal tube or rubber bulb after the manner of Brewer (3), Bernheim (4) and McRath (5); fourth, indirect transfusion by the withdrawal of blood from the vessel of the donor into a suitable receptacle and its injection into the circulation of the recipient.

Indirect transfusion may be accomplished in two important methods:

(a) The syringe cannula method of Linker (6), Crile (1) and others; and

(b) The paraffinized glass tube method first suggested by David and Curtis (8), Sattler and Heller (9) and partially by Kimpton and Brown by means of the instrument first described by them in the *Journal of the American Medical Association* July 12, 1916 (10).

I have not only read numerous references to any of the methods of transfusion in present use, but further than that, saw them in my own partially through the kindness of Dr. J. M. Crile, Jr., of Cleveland, Ohio, who has been instrumental in securing the use of the Kimpton-Brown tube in the United States. I have found that general usage of the Kimpton-Brown tube is well justified, especially in the treatment of those interested in transfusion, and that the Kimpton-Brown tube is well justified in the present state of our knowledge of the subject.

Without going into the detail of the different operations for transfusion which have been heretofore brought forward, I desire to present to your attention the Kimpton-Brown tube and to describe the technique of transfusion by this method.

The peculiar instrument consists of the Kimpton-Brown tube and an ordinary cauterizing bulb. The tube are of two sizes and are graduated up to 100 ccm. and 250 ccm. respectively (Fig. 1).

Other instruments needed (Fig. 2) are such knives as scissors to use in arteries of recipient and sutures as may be necessary to expose the vein of the donor and recipient. A fine sharp knife such as a cataract knife is best used for opening the vein and in most cases just before time to make a very small incision should be made for catching and teasing the exposed vein. If more than one tube is to be utilized it will have a few silk ligatures secured early in the vessel while the ligatures are not tuberculated in the muscle. A hypodermic syringe for injection of the local anesthetic is also essential.

The safety and success of the operation depend upon the proper preparation of the tube. It is simply and not ingeniously a uniform solution of paraffin over its entire inner surface. The tube is applied by placing in it the tube of the donor in paraffin wrapping the tube in a towel and sterilizing it in the autoclave. When the tube is removed from the autoclave and all well.

From what it may be generally stated, I only suggest precautions until the next time. It is not saturated with the liquid paraffin which quickly hardens the vessel being applied. It is not saturated with the liquid paraffin which quickly hardens the vessel being applied. It is not saturated with the liquid paraffin which quickly hardens the vessel being applied.

Another way of sterilizing the tube is to place it in a solution of 1% formalin for 24 hours and then wash it with water. It is then wrapped in a towel and sterilized in the autoclave. It is then wrapped in a towel and sterilized in the autoclave. It is then wrapped in a towel and sterilized in the autoclave.

The Kimpton-Brown tube is well justified in the present state of our knowledge of the subject. It is well justified in the present state of our knowledge of the subject. It is well justified in the present state of our knowledge of the subject.

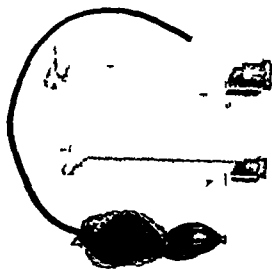


Fig. 5. The knipt flow tube used in the operation.

similarly exposed. A ligature is placed around the vein at the donor and it is tightened proximally (Fig. 5).

Incision is made in the ligature which elevates the vein and it is pinned temporarily with the attractor knife. The edges of the incision in the vessel are held apart by the assistant with mosquito forceps and the tip of the tube directed at the periphery is inserted into the lumen of the vein (Fig. 5 and 6).

The knipt is directed to open and the hand slowly and with pumping, flexion and right about will fill the larger tube in from 1 to 2 minutes. Contraction around the upper arm is not usually necessary but will accelerate the flow of blood. When full the tube is quickly withdrawn and turned so that the tip of the tube is directed at the tip of the tube. The vein is placed that when held in the manner illustrated in Fig. 5 no blood will escape from the completely filled tube.

As the tube is withdrawn the vein is clamped temporarily for further use or left to remain for closure if no more flow is desired.

The vein of the recipient is treated exactly as that of the donor except that it is ligated distally and when opened the tip of the tube is directed centrally (Fig. 6).

The cautery bulb previously utilized is attached to the side tube. Very light pressure is

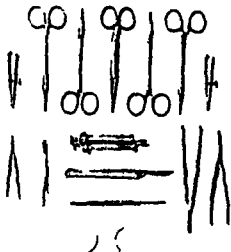


Fig. 6. The knipt flow tube used in the operation.

exerted and the flow into the vessel of the recipient at a rate which is always under control.

If more flow is desired the operation is repeated with a fresh tube. The tissue remains to be done except to close the small wound made in exposing the vein.

The entire operation is quickly performed and if the tube has been properly prepared and there is no undue delay in transferring the blood from donor to recipient there will be no coagulation.

If an antiseptic mixture is not being prepared in part, a solution of part (tear) or part of a low melting point has been used. The tube is quickly inserted, running hot water through it after which the mixture should be removed with alcohol and ether.

A few minutes of waiting is not necessary in this technique.

In transferring the tube the thumb should be placed on the side of the tube as illustrated in Fig. 5. It is never necessary to touch the tip of the tube. The knipt is held with the thumb and the thumb is held over the side tube which accomplishes the same purpose.

When the flow is being injected into the vein of the recipient the thumb pressure on the side of the tube is maintained as in Fig. 7. It might be feared that the tube will be dislodged or the palm of the hand placed over



Fig 3 Donor is posed ligated centrally and tube ready to be introduced into it the tip directed peripherally

the end of the tube will effectually close it and allow the transfusion to proceed

3 The transfusion should be stopped before the last few cubic centimeters of blood have escaped as the entrance of air into the vein is thereby avoided

The experimental work for the perfection of this tube and the development of the operation was carried on by Kimpton and Brown in the Department of Comparative Pathology of Harvard University (10) It has now passed far beyond the experimental stage

In a personal letter Dr Kimpton tells me that he has used it successfully in more than forty cases that it is used in all the Boston hospitals and that it is used exclusively in Cushing clinic where over fifty successful transfusions have been performed Our experience with it in Birmingham has been uniformly favorable It has been used by different surgeons who have become familiar with its advantages in twenty-three cases that I know of a number of these being in my own hand The oldest of my patient was a man of 75 and the youngest a baby of 5 months

I have recently noticed the criticisms of this

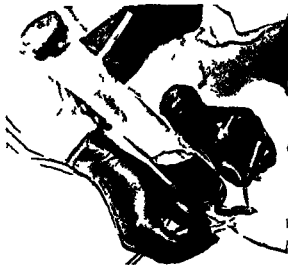


Fig 4 Tube in donor's arm and blood flowing into the tube

method of transfusion by Bernheim and Jones in which they say

The disadvantages are rather formidable one of these being that the vessels of the donor and recipient must be exposed by incision and prepared with great care in order to prevent clotting and failure of the blood to flow the other being the bulky awkward glass cylinder which will occasionally break (12)

The incisions required do not differ in character or extent from those employed in suture or canula methods and the preparation of the vessels is simpler I do not consider exposure of the veins a serious drawback It is a matter of no moment to donor or recipient in the presence of acute hemorrhage or other emergency and will be readily assented to in any chronic condition where transfusion is indicated

This operation has a distinct advantage over the anastomosis methods in that if clotting occurs



Fig 5 Proper method of holding the tube while transporting blood from donor to recipient



Fig 6 Recipient's exposed leg tied distally and the tube filled with blood ready for introduction into the tip of the tube directed centrally

it is immediately detected. That the use of the tube has not been a drawback is attested by the extensive use that has been made of the method wherever it has been introduced.

The coating of the tube with paraffin presents no difficulties, and the accidental breaking of the glass can only be guarded against by using such care as an operation of this importance demands.

I believe more successful transfusions will be performed when the veins are exposed and opened than when punctured through the skin with canula or needle; therefore I do not favor the modification Bernheim and Jones suggest—that of attaching a Lindeman canula to the tip of the tube. One very great advantage of this method is that donor and recipient do not have to be brought in contact with each other as in the anastomosis methods. Indeed it is not necessary that they be closely approximated or even in the same room. This feature contributes largely to the convenience of the method and makes it available under surroundings



Fig 7 Tube in position; the bulb attached and the blood being slowly forced into the vein of the recipient

where direct or indirect anastomosis might be impossible.

While the last word has not been said concerning either the technique of transfusion or its many other problems, I consider the Hampton Brown technique the simplest and surest method yet devised and one that may be used by the surgeon with perfect safety in the hospital or in the home.

A wider acquaintance with its advantages should result in a great broadening of the field of successful transfusion.

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CORRESPONDENCE

THE USE OF THE BROAD LIGAMENTS IN OPERATIONS FOR RELIEF OF CYSTOCELE

To the Editor In the issue of SURGERY GYNECOLOGY AND OBSTETRICS for March 1915 I have read with great interest the article by Dr C H Mayo entitled Uterine Prolapse with Associated Pelvic Relaxation No discussion of the dynamics of the female pelvis is indulged in nor of the etiology of the condition There is presented however a beautifully illustrated description of an operation for its relief The feature that especially interests me is the fact that he utilizes the broad ligaments as a support to the bladder for the relief of cystocele Therein he applies a great principle of support that Nature utilizes in sustaining the normal positions of the organs in the female pelvis and to that degree he is conforming to Nature's plan—which is the true method—and therefore is destined to insure the greatest success

While the author gives credit to Kocher and Murphy for certain devices for the relief of the condition under discussion which to say the least are far removed—very far removed—from Nature's plan of doing things he makes no mention of the operator who first suggested the use of the broad ligaments for the support of the bladder in cases of extreme cystocele and who devised an operation based on that principle

I would not take your time and pace Mr Editor to call the attention of your readers to a question of priority did I not believe that this

device is a distinctive contribution to the surgery of procidentia and cystocele and destined to secure a permanent place in our armamentarium

I would like to suggest to Dr Mayo that as he has gone so far in the imitation of Nature's plan of support for the bladder he go just one step farther and restore the bladder to its normal position on the anterior face of the broad ligaments instead of the posterior

For descriptions of my operation the author is referred to *The American Journal of Obstetrics and Diseases of Women and Children* 1910 lvi No 4 *The New York Medical Journal* May 18 1912 *The Medical Record* November 16 1912

J RIDDLE GOFFE

New York City

The following letter was submitted to Dr Martin in reply to Dr Goffe

My dear Editor I did not credit anyone especially in my article because there has been such a multitude of men engaged in the progress of gynecology in relation to these peculiar operations I merely said that we had been doing the operation for twenty five years by the method described Dr Goffe claims priority for a method different from the one described in my article

C H MAYO

Rochester Minnesota

TRANSACTIONS OF SOCIETIES

CHICAGO SURGICAL SOCIETY

REGULAR MEETING HELD FEBRUARY 5 1915 WITH THE PRESIDENT DR DANIEL N EISEN-
DRAH IN THE CHAIR

RESECTION OF THE BONE FOR PROTRUSION OF THE MANDIBLE

DR THOMAS L GILMER (by invitation) read a
paper entitled Resection of the Bone for Protru-
sion of the Mandible (See p 735)

DISCUSSION

DR JOSEPH LIESENSTADT This is the second
case for which I have calculated the size and form
of the bone segment for the resection of the jaw
in prognathism. By way of explanation I should
be said that the etiology of this deformity may be
traced to the premature loss of all the six year
molars furthermore that the calculation necessarily
was based upon the position of the twelve year
molar which had approximately assumed the posi-
tion of the six year molar by anterior movement
through the alveolar process.

The basis for calculation in determining the
amount and form of the bone segment is dependent
upon two facts. First the principle of normal
occlusion. This may be defined as the normal
anteroposterior relationship of the upper and lower
six year molars when they are in articulation or
occlusion as the latter is called by dental surgeons
and orthodontists. The anatomical relationship
more specifically requires that the anterior buccal
cusp of the upper six year molar lie within the
buccal groove of the lower six year molar when
these teeth are in occlusion. Therefore it may be
said that the symmetry of the jaws and the relations
of the alveolar processes are in perfect harmony
when the six year molars have their anteroposterior
relationship.

The second fact precludes that the plane formed
by the occluding surfaces of the lower posterior
teeth is perpendicular to a line drawn through the
long axis of the ramus that is to say the inclination
of the angle of the jaw in an adult is approximately
90 to 100° or a right angle. It was determined
with a millimeter gauge that the lower twelve year
molar protruded one half an inch beyond the upper
twelve year molar. This distance was used as the
superior dimension of the bone segment or it may
be said determined the width anteroposteriorly
of the superior border of the segment. From the
outline of the mandible revealed in the radiogram

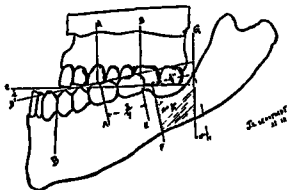
it was approximately estimated that the angle of
the jaw had an inclination of 120 to 125°.

It is necessary to state further that by the estab-
lishment of definite planes which correspond in the
first place to the occluding surfaces of the lower
posterior teeth and in the second to the long axis
of the ramus we have guides for constructing a
right triangle. Accordingly a line was drawn
through the long axis of the lower twelve year
molar perpendicular to the occluding surfaces of
the lower teeth. A second line was drawn parallel
and representing the occluding planes of the lower
posterior teeth extending through the ramus. A
third line was drawn one fourth of an inch posterior
to the posterior root of the last molar parallel to
the long axis of the twelve-year molar and per-
pendicular to the first line or that one representing
the occluding plane of the teeth. This was estab-
lished to insure a sufficient amount of bone to
receive the silver wire loop passed through the tissue
for approximating the fragments and to avoid any
pressure upon the periodontal membrane of the last
tooth. The fourth line was drawn through the
long axis of the ramus and determined the in-
clination of the posterior border of the bone segment.

We thus have established three borders for the
bone segment: the anterior border represented by
the perpendicular line drawn through the body of
the mandible which is located one fourth inch
posterior to the root of the last tooth and also
perpendicular to the occluding plane of the lower
posterior teeth. The second line established the
plane of the superior border of the bone segment
that is to say the line drawn continuous with the
occluding plane which extended transversely
through the ramus. A learner understanding of
the outline and form of the segment may be learned
from the accompanying illustration.

Accordingly after the bone segment had been
removed definite relationship was established
between the upper and lower posterior teeth as
well as a normal inclination given to the angle of
the jaw.

DR WILLIAM M HARSILA In the case reported
I congratulate Dr Gilmer on the result of the opera-
tion. In May 1914 I did the first operation of this
particular kind so far as I have been able to learn.
The cases are not common as I have seen but one



View of left side—level with occlusal plane, $\frac{1}{2}$ c h
D — showing form and superior dimension of bone segment calculated from the difference between the occlusal planes of the upper and lower bicuspid and molars

since Prognathism affecting both upper and lower jaws is found in some of the lower races Professor Starr of the University of Chicago showed me from his collection one of a Mexican girl showing the true type with perfect occlusion. Affecting the lower jaw it is not considered a reversion of type but a developmental error with probably an hereditary influence. My patient had a younger brother with the same type of mandible but in less degree. In my case the third molar was absent and the mandible was lacking in the proper angle. The malocclusion resulted in narrowing of the upper jaw. The lower incisors projected five eighths inch beyond the upper teeth. The absence of the third molars and the extra length of the mandible gave room for excision and at the same time enabled us to form a proper angle by making the segment removed wedge-shape. The site of operation in Dr. Gilmer's case and in the one I reported three years ago is unquestionably better than in any operation previously done because of its accessibility. If a molar is in the way it can be extracted and healing allowed to take place and then the operation can be done without penetrating the mouth cavity. The scar can be placed under the jaw.

CASES ILLUSTRATING BONE SURGERY

DR. WILLIAM HESBERT CASE 1: The first patient is a lady 30 years of age who gave a history of having had rickets in severe form when she was a child. She developed a marked case of bow legs for which she was operated when she was 10 years old. An osteotomy was performed on both tibiae and femurs and the deformity remained corrected for a long time. In time however as the bones grew a genu varum developed which finally reached an extreme degree. Unfortunately the photographs which were taken before the operation were spoiled but I think I can illustrate the condition fairly well on the blackboard.

The roentgenograms show that the angulation at

the knees is due to the undeveloped condition of the inner condyle of the femur. There is almost no inner condyle in the outline but the tibia is quite normal in appearance. When the patient was standing the long axis of the leg passed far to the inner side of the knee-joint which put the limb at a great mechanical disadvantage. All of the ligaments of the knee-joint were loose especially the external lateral which bore most of the strain. There was somewhat more angulation on the right side than on the left.

An osteotomy was performed on both sides. A wedge-shaped piece of bone was chiselled out above each joint on the outer side severing about two-thirds of the diameter of the femur. The bones were then carefully fractured at this point. The legs were then straightened and placed in a slight genu valgum position the wounds sutured and both limbs encased in plaster of Paris. It is now ten weeks since the operation and the X-ray plates taken recently demonstrate clearly the correction of the deformity and the healing of the fracture.

As you see the patient is able to walk freely unassisted and has overcome the waddling gait which was so marked before operation. When the casts were removed six weeks after operation it was found that the knees were quite rigid and motion was very painful. With massage and passive and active motion this has been overcome so that now when seated she can bend the knees to a right angle. I felt some concern regarding the behavior of the loose ligaments and capsule. Examination shows however that there is very little lateral motion at the joint and that the ligaments are becoming stronger and that no external support is necessary.

CASE 2: This case is an interesting one. The boy 13 years of age while playing ball about the middle of last November fell down and another big boy fell on his thigh. He noticed nothing in particular for a week or ten days. After ten days he began to have pain, and it was noticed he was limping but nothing was done at home until about two weeks after the accident the time when I first saw him. For ten days he had been limping more and more and was having quite severe pain in the right thigh. Examination at the time disclosed a distinct swelling which could be felt about the middle third of the thigh at the outer and anterior aspect of the limb. The mass was deeply placed under the muscles was hard and seemed to spring from the bone. The lower pole was sharply outlined by a distinct border otherwise the outline was diffuse. The tumor was quite tender on pressure and there was some pain on active and passive motion of the leg. The history and clinical development was very suggestive of a sarcoma but the palpatory findings were not so characteristic. This X-ray plate taken about two months ago reveals the femur to be not involved. The shaft and periosteum are normal in appearance and outline. On the outer side of the femur distinct and

separate from the same there appears a somewhat diffuse shadow about four and one-half inches in length and varying from one to one-half inch in thickness. This picture is that of an ossifying myositis. The Wassermann reaction was negative. The boy was put to bed for ten days and his symptoms disappeared spontaneously. The X-ray picture taken a few days ago differs from the earlier one in that the mass is more sharply defined as to density and contour for the process has reached the quiescent stage.

Myositis ossificans is important owing to the ease with which it might be mistaken for sarcoma. When operated in the early active stage it has a tendency to recur just as does a malignant tumor. Who can tell how many cases of myositis ossificans have been operated upon for sarcoma and cured. The most important thing in these cases of suspected myositis is to make a correct diagnosis and the next important thing is to let it alone in the acute stage. If after the establishment of the period of quiescence there are symptoms due to mechanical pressure or interference with motion then the time is ripe for operative removal.

CASE 3. I will now show you a number of cases of acute osteomyelitis illustrating different methods of treatment. This boy was 8 years of age on September 21, 1911, when he was admitted to the Alex. Brothers Hospital. There was a history of his having been sick for two weeks previously with all the classic symptoms of acute suppurative osteomyelitis of the tibia. He was operated upon immediately and pus was found in the soft tissues and beneath the periosteum. The medullary cavity was opened with a chisel and the marrow found infected. It is not sufficiently appreciated by the profession that in acute osteomyelitis the early diagnosis and immediate evacuation of the infection is just as imperative as in acute appendicitis. Were this the fracture chronic bone abscesses with sinuses and sequestra would become rare indeed.

The symptoms in this case improved. The wound was soon granulating nicely. After four weeks it was found that the shaft of the tibia was loose at both epiphyses and a fair amount of involucrum had already formed. This was chosen for a removal of the entire necrotic shaft. In the removal care was exercised not to move the newly formed involucrum adherent to the periosteum. That the involucrum was not removed is shown by the specimen which is here exhibited. After about seven months the shaft had regenerated to its former size and the boy was able to walk perfectly well. It is now three years since this operation and aside from the scar the leg is normal throughout and there has been no interference with growth.

Relative to the treatment of acute osteomyelitis there can be no question but that an early evacuation of the primary focus is imperative. But what should be the later treatment? Should it be conservative

waiting for sequestra to be discharged or removed—or active namely the early removal of the whole or a part of the necrotic shaft? I believe that no plan can be laid down which will cover all cases as there are such differences in virulence of infection, and consequently in the amount of necrosis. I believe that where there is total necrosis of the shaft and where the same is loosened from the epiphyses, it is best to remove it as early as possible before the involucrum has become too thick. As much of the involucrum as possible should always be left behind for if you remove this new bone you are removing nature's process of repair and regeneration. I believe that in those cases of resection followed by failure of regeneration either the entire involucrum or too much of it was removed with the necrotic shaft. I have a case here tonight which illustrates this point.

CASE 4. Here is a boy now 15 years old who was admitted to the Alexian Brothers Hospital in 1910 suffering with acute suppurative osteomyelitis of the right tibia. He had been sick a week before admission and it was a very virulent infection which resulted in necrosis of the entire shaft. At the time of immediate drainage of the medullary cavity two weeks after the shaft was loose and crepitating at both ends and was removed without molesting the involucrum. The wound healed and in eight months the shaft had fully regenerated. About this time he fell and fractured the newly formed shaft. The repair of this fracture was in no way different from the normal. You will note a bony ankylosis of the knee at an obtuse angle. This is the result of an extension of the infection through the upper epiphysis into the knee joint—a rather rare occurrence. This complication has somewhat retarded the growth of the tibia and the leg is slightly shorter. He is so well satisfied with the usefulness of his leg that he refuses an arthroplasty of the knee.

DR. WELLS: Have you ever had any failures of regeneration from subperiosteal resection of the shaft?

DR. HASKIN: I have and I have a patient here who illustrates that point.

CASE 5. This boy, 1 year old, suffered a rushing injury of the leg for which I amputated at the junction of the upper and middle thirds. He was wearing an artificial leg and was doing very well until December, 1912, when a small ulcer developed on the end of the stump. This was soon followed by an acute osteomyelitis of the other tibia. The infection was not as virulent as in the other two cases just reported so after early drainage I decided to treat this case conservatively. It took a year and a half before the last was closed up during which time I removed a number of sequestra. It is all healed now and compares favorably with the two previous cases.

While the tibia was in the active stage there was a sudden involvement of the upper end of the left humerus. This was drained promptly and

later on a large sequestrum was removed as long as half of the shaft. In the case of the femur and humerus I believe that the later treatment should be conservative for to remove the entire shaft would be to remove the entire support of the limb for in the lower limb it must be remembered that the fibula remains to preserve the continuity.

Another interesting feature of this case is the following. He was taken sick in December in March an acute suppurative arthritis developed in the left elbow joint. The aspirated fluid showed staphylococci and was purulent. Two injections of a per cent formalin glycerin were made with an interval of ten days, and the infection cleared up with perfect motion of the joint remaining. The joint was not drained. Under like circumstances in the old days we would have drained this joint and an ankylosis would have been the result.

Dr WILLIAM FULLER How did you dress the case?

Dr HYSBERT Just immobilized it. There is a curious subluxation of the radius which is one of the sequelae of the suppuration but does not matter ally interfere with motion.

CASE 6 This is a case which I have exhibited before the Society on a previous occasion and I am bringing him forward again to illustrate several points in this symposium. First it is a case where regeneration failed and second I wish to show the ultimate result after bone grafting. This boy had been sick five days with acute osteomyelitis of the lower end of the tibia when he entered the hospital. A free incision was made and the medullary cavity drained. Six weeks after the primary operation the lower end of the bone was loose at the epiphyseal junction. The necrosis had remained limited to the lower end of the tibia. The lower end of the tibia was resected the section being made above through healthy bone. Great care was exercised in preserving the periosteum. This specimen shows however that considerable of the involucrum came away with the bone and was thus removed. This might explain the failure of regeneration for after the lapse of about a year there was still little new bone formation except a little tapering of the ends. It is now two years since a bone graft was inserted into the gap and the cosmetic and functional result is satisfactory. In my opinion the failure to regenerate was due to the removal of too much involucrum and with it the active proliferating bone claim. For the fibrous periosteum will not form bone. My experience lead me to believe that resections should be reserved for cases of necrosis of the entire shaft whereas in cases of necrosis of only one end of the long bone or in case of the femur or humerus conservatism should be practiced.

MULTIPLE BONE CYSTS

Dr ALLEN B. KAYE. It is not my intention to take up the time of the Society in discussing the general subject of multiple or single bone cysts.

nor do I present this man to you as a particularly new case since the case has already been reported by Dr Harting in the *Imican Journal of Röntgenology* of March 1914. The patient has been seen by many of you on the service at the Cook County Hospital.

I wish particularly to discuss the question of operation for multiple cysts and the microscopic characteristics of the material contained in the cysts.

This patient Mr. Chris Berg nine years ago began to develop cysts. They appeared first in the femur and following that time he was in the hospital for five or six years constantly in bed or in a wheel chair. When he came into my service a year and a half ago he complained of pain in both legs where new cysts were developing. The question arose was it advisable or permissible in a case of this kind to operate upon multiple bone cysts? It seemed to me after investigating the question that we were justified particularly inasmuch as the man complained of severe and intense pain. In spite of what has been written upon it we really know very little about the subject of multiple bone cysts, whether they are associated with infection with osteomyelitis and other conditions. And too the question of chronicity comes up for we do not know how long these patients live if properly treated. We do not know whether if we operate on these cases early and remove the cysts promptly it may not prevent extension of the process in certain types of cases to other portions of the body. In our case we scraped out two of the cysts causing pain and in both instances the result was perfectly satisfactory. There was regeneration of bone the tibia and fibula healed without fracture and instead of being retained at the hospital eight or nine months the patient has been enabled to walk but he feels dizzy and finds it safer to use crutches.

I will show you one of the older cysts he has had. Here is one of considerable size. It has a fracture of the humerus at this point [indicating]. He has a cyst in one of these ribs and an immense tumor here in the upper portion of the femur. He has had a cyst in one ulna and radius. You can feel the cyst plainly. He also has a cyst in the inferior maxilla. Notice the place where we removed a cyst from the tibia of the left leg. The tibia of the opposite leg was operated upon and at that point good hard bone developed. In both cysts removed we found a granulomatous type of tissue it was rather tenacious and around each one of these cysts was a thin lamella of bone. In both cysts the lamella of bone was broken down and the cyst material scraped out. We packed one cyst on account of bleeding and the other was closed.

The patient is now in good health having gained twenty pounds in the last year.

In single cyst transplantation of bone has been undertaken by Lexer and others.

Dr DAVID STRALS presented a case of multiple bone cysts.

Dr EMIL BECK also presented a case of bone cyst

Dr W W BISSELL The pathology of this condition has been more or less indulged in this evening, and there is nothing that I can add of any particular merit aside from the contents of the giant cells

As Dr STRAUS indicated it is only in the acute conditions that giant cells are found to be thickest while in the more subacute and chronic conditions they are less frequent Even in microscopic preparations taken from the contents of these cysts by Dr KANAVEL even in one field it is easy to see in the older part of the process, that is where there is active cartilage formation and a great deal of tense fibrous tissue very few giant cells while in the preparations where there are loose connective tissue stroma and a great deal of hemorrhage there are a great many giant cells and at the same time the giant cells in this particular area contain a great number of nuclei For this reason it seems reasonable to suggest that the active surgical treatment of these conditions is probably indicated in that the giant-cell formation no doubt is a progressive process rather than a regressive one Unfortunately the etiology and pathogenesis of these conditions are difficult to study on account of the age of the patient that we have before us The onset of the condition varies greatly and complaints are relatively infrequent until such a thing as a large tumor or a pathologic fracture occurs, and we are unable to study the contents

In this preparation of the tissue taken by Dr KANAVEL a little over a year ago, I believe I attempted to find out what the cytoblastic giant cell contained It was thought it was made up of fibrin but with all the differential stains for fibrin I was unable to detect any fibrin in the cells whatever We turned our attention to the fat, and the giant cells we had noticed contained vacuoles Apparently these vacuoles might have been fat we stained them for fat and were unable to find any fat in them Recently we have had a chance to study tissue removed over a year ago and that tissue has been in formaldehyde for a year and that destroys fat quite readily Even in that tissue we were able to demonstrate these vacuoles and fat A great part of the cytoplasm of the giant cells themselves is made up of a substance we are not familiar with but with careful study of the giant cells it is reasonable to think they are made up of fibroblasts or fibroblastic elements In giant cells containing but very few nuclei, it is sometimes quite easy to distinguish definite outlines of fibroblasts the cytoplasm of which is undergoing degeneration to form the cytoplasm of the giant cell However in the giant cells that contain upward of fifty or a hundred or more nuclei, this is impossible

I will put these under the microscope so that you can examine them I will put in a fat stain and Mallory aniline blue stain

Dr C W PEARLSS (by invitation) gave a talk

on The Origin and Fate of the Osteoclasts in Relation to Bone Resorption (See p. 678)

Dr D B PHARMISTER read a paper entitled Sarcoma of Bone

DISCUSSION

Dr WILLIAM FULLER Many questions in bone diseases and bone surgery are as yet unsettled Ordinary fractures still offer many difficulties in diagnosis and treatment and wide is the difference in opinions as to the best methods of their management In view of this may we not ask the question Have we really such a thing as a true bone cyst?

While an affirmative reply may be given it should be done I think with a correct definition of a cyst in mind The bone cyst itself at the same time should possess all the chief characteristics of a cyst that is it should be a collection of fluid within definite walls whose lining is paved with epithelium and from which the cyst contents come This definition describes but one cyst of bone and that is the dentigerous cyst occurring at the roots of dead teeth and which were first described by Turner and later by Bland Sutton

The so-called bone cyst as generally found is lacking in all the histologic characteristics of a true cyst there is no epithelium the fluid of the cyst is not a transudate nor an exudate it is not the product in any way of the cyst wall, which is often a connective tissue the result possibly of inflammatory conditions as pointed out years ago by Recklenhausen and others Virchow thought these cysts were due to some kind of degenerative change in tumors such as sarcomas enchondromas, myxomas, etc He regarded this connection with out question even though the characteristic tumor cells could not be found Whether the cyst under discussion here is the end product of some inflammatory condition as in osteitis fibrosa or is liquefied portions in various tumors is not so important to surgeons and will not be settled by them but what concerns the surgeon more than all else is the measure which when put to use may be relied upon to effect a cure of this condition We are in a position now to try I think that surgery will do this opening and setting and packing suffice in a large proportion of the cases if seen early This measure which not only cures the cyst speaks strongly for its close relation to some inflammatory condition and against its relation to a neoplasm Partial removal will not eradicate malignant or innocent tumors of bone but the simplest measures will generally bring about repair in inflammatory lesion of bone

I have had a few bone cysts which appear to bear out this contention and I will here briefly report them and show the slides made from radiograph while they were under observation The first slide shows a bone cyst in the proximal phalanx of the middle finger of the right hand of a boy of 17 years of age The bone is seen to be enlarged and the cortex of the bone much thinner than

normal. A small gutter was made in the bone the bone curetted and packed and a cure promptly followed. The operation was done for deformity and not for subjection symptoms there had been no pain nor disturbance of any kind in the finger. The microscopic diagnosis was sarcoma.

The next slide shows a bone cyst of the middle phalanx of the ring finger of the left hand and also a cyst of the metacarpal bone of the same finger in a young girl 20 years of age. In the phalanx the condition resembles the first case except that in this latter case there had been great pain and the finger was sore to touch. The metacarpal bone containing a cyst which was not tender nor swollen nor had ever given pain its discovery was accidental. The cyst of the finger was opened curette and packed. A cure promptly followed. The microscopic diagnosis was thought to be sarcoma.

The next slide shows a spontaneous fracture of the proximal phalanx in the right hand of a young woman of 30 years of age. In the attempt to turn a key in a door the fracture occurred and the hand became immediately helpless. A roentgenograph showed the fracture and the bone cyst which had left the bone as thin as tissue paper. The patient refused operation and the fracture was treated as a traumatic fracture and the union in the phalanx was as prompt and solid as one would expect in any ordinary phalangeal fracture. The fracture appeared to have a beneficial effect on the cyst as no evidence of its presence was manifest in any way thereafter. There was no pain swelling and the finger was as useful as before the fracture.

The next and last slide showing the bone cyst is a cyst of the metacarpal bone of the ring finger in a man of 35 years of age. At the site of this cyst is also a fracture which was produced in an effort at lifting or moving an iron stand at a writing desk. Operation was refused and the fracture was treated as in any traumatic fracture. Union of the bone took place without ill results and was solid and firm thereafter.

I have had two bone cysts of the jaws one of the upper and the other of the lower jaw. They resembled not in the slightest detail the bone cysts of the fingers. Curettement and packing which had to be repeated several times effected cures in both instances.

The next few slides will show the long bones of a man of 50 years of age who has osteomalacia and will show also the metacarpal and metatarsal bones with all the phalanges of the hand and feet of a son of this man and who has the same disease.

The first slide shows an oblique fracture of the femur which occurred while the man was sitting quietly in the chair. The next slide shows a spontaneous fracture with absorption of both heads and necks of the femora. A spontaneous fracture of one humerus occurred while the patient was under treatment for the fracture of the shaft of the femur. The fractures of the femoral necks occurred some three years previously. The remaining slide showing this patient's other long bones depicts unmistakably when the roentgenographs are under good focus bone changes in many areas due to some rarefying process similar to those seen in osteomalacic bone. One other point of interest in this case is the exposed phalanges of the great toe due to an ulcerative process in the soft tissues and is mentioned because it resembles the condition of practically all the metacarpal fingers with some of the metacarpal and metatarsal bones of both hands and feet of the son whose roentgenographs are here shown without further comment. A no explanation is further needed. The terminal phalanges of all the fingers are uncovered by ulceration in the soft parts and a similar condition is noted in many of the toes. A poor example of the atrophic changes in the bones. The boy was then sickly and in the poorest of health.

Both eyes were under observation for a week during which time adrenalin was given without the slightest improvement in either case. The father now three years since the treatment is better and the son has died. A sister of the father has osteomalacia.

BOOK REVIEWS

A CRITIQUE OF NEW BOOKS IN SURGERY

By MAJOR C SEFLIG M.D. St Louis

ONE so often hears the dictum that broad interests cultivate tact that one grows to consider the mere statement an axiom. Men argue that sympathy is an unqualified essential attribute of the good doctor because sympathy is an inherent factor in the practice of medicine and they argue further that tact is an equally common attribute because the doctor as a result of his multiple and diverse minglings with so many individuals must willy nilly grow to be tactful. Perhaps all this is true and perhaps it is not. If we concede argumentative force to reasoning by analogy we may prove that multiple human contact does not in itself guarantee tact because those precursors of modern surgery the barbers in spite of intimate relationships with a most varied clientele not learned during ages of time the tactlessness of loquacity. Furthermore just to clinch the argument we may show conclusively that one whose points of contact are few and slender may nevertheless be the very embodiment and apotheosis of tact. Take for example that arch recluse the book reviewer submerged in his study den completely out of touch with the world of men and things. He must build up while he destroys and he must be able fairly to flagellate without administering even a suspicion of sting. To do all this requires rare tact, but he has to do even more he has to conceal tactfully his own limitations and deficiencies as critic. And in concealing them—let us be perfectly frank with each other—he not infrequently steps over the border line of true tact and starts abed in hypocrisy.

It is well for every book reviewer to recognize the insidious danger of hypocritical concealment of his own deficiencies for he is thereby emboldened to say now and then "This work is in my line you ought to know about it but I cannot tell you, for I do not sufficiently understand it myself." There is ample precedent for such candor. When Dr Johnson was asked by a lady why in his dictionary he had defined pueria as the knee of the horse the lexicographer replied "Ignorance madam, pure ignorance." An almost equally crass ignorance disconcerts us in commenting on this first book for review. Dr Knox is radiographer to King's College Hospital Cancer Hospital Great Northern Central Hospital and the London Gen-

eral Hospital. His qualifications of authorship can scarcely be doubted. And yet his treatment of the subject is so largely technical that the average surgeon to which large group your humble book reviewer belongs, is not competent to pass adequate judgment.

The volume is divided in two parts. Part I is devoted to radiography and covers two hundred and fifty pages. Every detail of the X-ray armamentarium is described in full and there is an attempt to describe the interpretation of X-ray pictures of the various organs. This portion of the work we know is deficient in parts. Dr Knox comes very far from furnishing adequate differential diagnostic points in asphylious tumors and cysts of the skeletal system. The same criticism holds true of his descriptions of lung pictures and one searches in vain through the pages led to the alimentary tract for an adequate description of the many new terms which have developed hand in hand with the newer X-ray work. The section on gastro-intestinal examination is on the whole however the best part of the book. It would be even better were it devoted in larger measure to detail new Knox's personal observations.

Part II is devoted to X-ray therapeutics and radium therapy. If re there enters in so much of the purely technical as to disarm any critic save the trained radiologist. Now and then one runs into statements that awaken the suspicion that the author is doubtlessly a bit too much of an enthusiast. For example on page 317 we read "The routine medical treatment (of exophthalmic goiter) with drugs has proved to be merely palliative and operative treatment has not been marked by any striking successes. X-ray appears to offer a chance of better results than either of the two older methods."

It is really not fair to pick out the flaws that we are able to recognize and possibly fail to note excellences because of personal limitations of knowledge. So we frankly use the volume as a text to point out the limitations of book reviewers in general. As a full time use the book is an excellent reference volume for the general surgeon's library.

THIS second volume of the month brings us face to face with an entirely different problem—a problem so widely heralded in the past few years as

to have a legitimate claim on the critical judgment of all surgeons. As a matter of fact the keen edge of criticism is somewhat blunted by the thought that independent judgment is already so well established that critical comment is hardly in place.

The volume which is really only a reprinting of eight of Crile's previously published papers evidently represents an attempt to fortify further the doctrine of anoci association. The eight essays deal with the following subjects: Phylogenetic Association in Relation to Certain Medical Problems; Phylogenetic Association in Relation to the Emotions—Pain, Laughter and Crying; The Relation Between the Physical State of the Brain Cells and Brain Functions; A Mechanistic View of Psychology; A Mechanistic Theory of Disease; The Kinetic System; Alkalescence; Acidity; Anæsthesia.

The doctrine of anoci association has been variously judged. A large and representative group of scientists has pronounced anathemas upon it; a larger group of less critical individuals has accepted it as a type of surgical saving grace; those more pragmatically inclined have set small store on the underlying theory but have accorded a high degree of value to the practical results that flow from it. The stand of the pragmatists is a solid one.

Unfortunately however Crile has not supported his cohorts in republishing his essays under the purely psychological title that he has chosen. Any one who has read Darwin's *Expression of the Emotions in Man and Animals* or let us say the more recent work of Bergson or Boris Sidis on laughter must feel that Crile has widely missed the mark in his attempt to fit his thesis into psychological theory and doctrine. In the first place there is no order of sequence to the eight papers which stand merely as eight entities representing a hope suggested in the preface that they point to conclusions whose application and significance have to do with the underlying psychological phenomena of various emotions. In the second place there is such a complete elision of all reference to established and controversial psychological data as to suggest faintly an unfamiliarity with such data. For example in the essays *A Mechanistic View of Psychology* and *A Mechanistic View of Disease* no one gains even a hint of the highly interesting controversy that has been waged and is being waged between the schools of Mechanists and Vitalists. In the third place Crile's process of thought is so supersaturated with teleology—the philosophy of purposefulness—that it forces him into the snare of explaining everything on the basis of ultimate purpose. For instance he states in page 79 that the only types of infection that are associated with pain are those in which the infection may be spread by muscular action or those in which the fixation of parts by continued muscular rigidity is an advantage. In other words there is no pain except in those infections where pain serves the purpose of limiting disease by limiting muscular activity. Two of the most severely painful infec-

tions are acute empyema of the accessory sinuses of the nose and furunculosis deep in the external auditory canal yet in neither of these instances is there any relation with muscular activity. And so we might pick out many other instances of the elusiveness of this doctrine of ultimate purpose.

The selection of the illustrations is not always happy. The pictures of a Venus fly trap, a contest between an bear and puma, a snake charming a bird, and a tiger approaching a cobra are bizarre rather than convincing.

On the whole the book is extraordinarily interesting in so far as it expresses the conviction of one of our most active resourceful and imaginative surgeons. We have before in this department expressed unqualified admiration for the practical stimulative influence of Crile's work. Failure to appropriate his psychology probably rests on the fact that we are not yet prepared to adopt root and branch the tenets of mechanism as applied to body function and activity.

LANE's work on intestinal stasis is so well known that this third edition of his monograph would hardly call for a detailed review were it not for the fact that it illustrates a type of medical thought that is antipodal to the doctrine of purposefulness so enthusiastically propounded by Crile. If we interpret Lane's fundamental thesis properly, he believes that Nature had no particularly definite purpose in view when she evolved the colon or else did have a purpose but woefully miscarried in her attempts to accomplish it. Unwilling as some of us are to subscribe to enthroning teleology as the reigning queen of medical philosophy we still have a profounder faith in Nature's good purposes and powers of achievement than Lane is willing to concede to her.

The book is made up of six chapters of which Chapter I is the most important devoted as it is to a full exposition of the author's notion of the fundamental facts related to the developmental phase of intestinal stasis, gross pathological consequences, results, symptoms and rational treatment. Chapters II, III and IV are contributed by Alfred C. Jordan, Nathan Mutch and James MacKenzie and are devoted respectively to *Ray Study of Chronic Intestinal Stasis*, *Bacteriochemistry of the Small Intestine and Disease of the Heart*. Chapters V and VI are reprints of early papers by Lane on *Pressure Changes in the Skeleton* and *The Anatomy and Physiology of the Shoemaker* (as illustrating concretely these pressure changes). Lane includes these two essays because they support his assumption that the development of the soft parts of the body are influenced by the same three fundamental laws which lay down the influence on skeletal growth.

There are many reasons why one should hesitate

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Clinical Congress of Surgeons of North America

SIXTH ANNUAL SESSION

BOSTON

OCTOBER 25 TO 29 1915

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THE CLINICAL CONGRESS IN BOSTON

On the following pages will be found the first of a series of articles dealing with the importance of Boston as a medical and surgical center. In this series the history of Boston's medical institutions will be reviewed and the present day activities of the profession described. These articles are to appear in each issue of this magazine up to and including the October number.

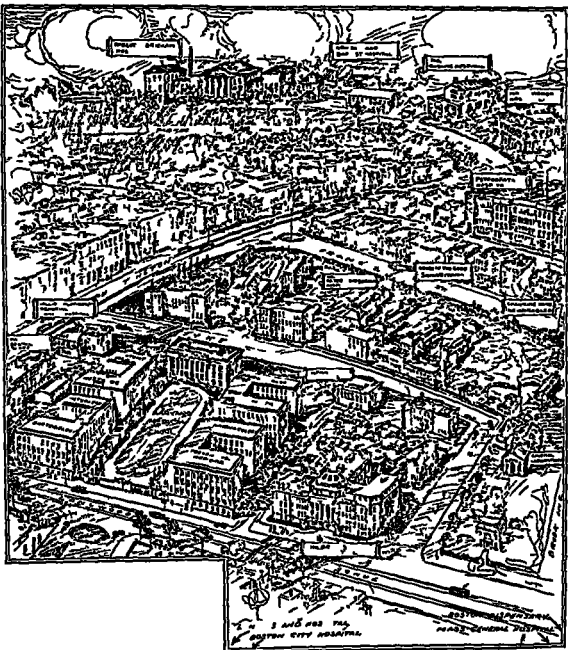
The plans for the Boston meeting are now well developed and the preliminary schedule of clinics and demonstrations to be given in the hospitals and medical school of Boston during the week of October 25th as printed in these pages strongly evidences the determination of the Committee on Arrangements that there shall be a complete showing of Boston's clinical facilities in all departments. The published schedule however is a provisional one and will be rearranged and amplified during the month preceding the Congress.

Following the precedent established at the London session in 1914 where the plan proved most successful attendance at the Boston session will be limited in number so that members may be assured that there will be no overcrowding. There will be a place for each one who receives a membership card. Advance registration

will therefore be required and within a few days a detailed announcement of the plans for the Boston session will be sent to all members of the Congress. Card will be issued in order of application and when the registrations have reached the required number no further card will be issued.

The use of special tickets at previous meetings has thoroughly demonstrated the efficacy of this plan to provide for the distribution of the visiting surgeons among the several clinics thereby preventing overcrowding. Admission to the clinics and demonstrations will therefore be by special tickets which will be distributed to the members each day at headquarters after the clinical program for the day has been posted on the bulletin board.

Headquarters will be established at the Copley Plaza which is centrally located in the Back Bay district and from which any of the hospitals and medical school may be reached in a few minutes. The headquarters will be located on the ground floor of the hotel where there is ample room for registration and ticket bureaus, bulletins, etc. On this floor also is the large ball room in which the evening meetings will be held.



View of Harvard Medical School and Boston City Hospital from the water

HARVARD MEDICAL SCHOOL¹

By JOHN BAPTIST BLAKE, M.D. F.A.C.S. BOSTON

IN the earlier days in this country physicians were trained by older doctors, the younger men being students and assistants in the offices of leading practitioners. At present however the great progress in medicine has made the problem of medical education extremely difficult.

Medicine cannot be taught either by lectures on general principles or by the citing of precedents. In this it differs from the work of both the theological and law faculties.

In the science of medicine precedents cannot be followed closely. The development has progressed through a series of revolutions. To teach this historically is as difficult as to organize a department in the science of government by a succession of lectures from revolutionaries. The young doctor must be taught through a full contact with the sick, and trained as an apprentice but in order to do this it is necessary for him to have a thorough training in the fundamental medical sciences a knowledge which can be given only to a limited degree through book or lectures. The student must also be trained well both to observe facts accurately and to reason clearly from the facts observed with the aid of knowledge of a science based on the observation of others. For all this a large equipment is necessary and an able trained and numerous teaching force. It is the aim of the Harvard Medical School to provide this in the best possible manner.

LABORATORIES HOSPITALS LIBRARIES AND MUSEUMS

The Harvard Medical School started as a branch of the University in 1782 when three professorships of medicine were established. The first degrees in medicine were conferred in 1788. Before 1811 the degree conferred was that of Bachelor of Medicine after that date the degree of Doctor of Medicine was established. The first medical school was built in Boston in 1813. In 1906 the medical school moved into its new quarters on Longwood Avenue.

This statement appears in the official register of Harvard University. The first medical lectures were given in the basement of Harvard Hall.

The first building devoted to medicine was Holden Chapel (1783). In 1810 the school moved to Boston and occupied rooms in a building at or about the present No. 400 Washington Street. The first building planned and constructed definitely for the school was erected on Mason Street in 1815 and may still be seen looking much as it did one hundred years ago. It is near the corner of West Street and is at present an engine house of the Boston Fire Department. This structure was gradually outgrown and the North Grove Street building close to the Massachusetts General was occupied in 1847. Friends and benefactors made this possible the land being given by Dr. Parkman. Less than forty years later the brick building at the corner of Boylston and Exeter streets was erected and occupied in 1883 though for many years the old North Grove Street school was used for section teaching. Exeter Street seemed in the early eighties far away from the center of the city indeed the Back Bay lands were but lately filled in and many of the now crowded streets were in the process of early construction. Transportation facilities were not good the horse cars in those days being small in size and few and far between. This Boylston Street building with the Sears Pathological Laboratory added some ten years later was in turn entirely outgrown and the New Medical School project first suggested by Dr. Henry Bowditch gradually took form and shape and in 1906 the present white marble buildings were formally dedicated by President Eliot.

The corporation faculty architects and consultants endeavored to plan for many future years. The large buildings may be increased one half beyond the present size should this become necessary there is still unoccupied land available. The rapid rise of hospitals about the school furnishes another factor which tends to strengthen the belief that the Harvard Medical School has at last after many wanderings found an abiding place for at least half a century to come.

This new group is composed of four large laboratories and an Administration Building. The arrangement encloses three sides of a graded court which opens on Longwood Avenue facing

¹ The description of the Harvard Medical School is derived from an article written for the *Harvard Alumni Bulletin* by Dr. E. H. Bradford. Dr. D. Harold C. Frost and Dr. John Bapt. Blake published February 5. Those who desire more extensive descriptions of the school and its facilities are referred to the Bulletin of the school and to the contributions in the past and to the contributions in the future. The school has made the science and art of medicine referred to the Bulletin of the school.



The Warren Museum

toward the city of Boston. The Administration Building (A) stands at the head of the court and contains offices of the dean, the faculty room, students' room, central library, recitation rooms and amphitheaters and the Warren Museum. The architects and builders have constructed a very dignified and very beautiful building guarded by a row of huge and lofty columns on either front. Standing on the terrace and looking toward Boston, there are two large laboratories on each hand that devoted to anatomy and histology (B) occupies the nearest position on the right and beyond it pathology and bacteriology (D) at the left is physiology and chemistry (C) and beyond it surgery and hygiene (E). Allied branches and subdivisions of these sciences are housed with their respective parents. Each of the laboratory buildings contains its own amphitheater, its library and its special facilities. All the buildings are connected by corridors and behind the laboratory (B) is a small animal house. The laboratories are constructed upon the unit plan, the unit sloping being ten feet including a window. In this way a room ten feet wide or any multiple of ten may be constructed by the simple placing of a partition of wire and concrete.

The central library is on the ground floor of the Administration Building. The main room of picturesque form has been recently decorated and is called Charles B. Porter Hall in memory

of the distinguished surgeon. With its branches in the laboratory building, the library contains more than 25,000 volumes and 10,000 pamphlets.

The upper three stories of the same building constitute the home of the Warren Museum. Founded by Dr. John C. Warren in 1847 and at first situated in the North Grove Street building, the museum has grown until it now possesses more than 10,000 specimens of normal and abnormal anatomy, besides models of bones, corrosion preparations, etc. Every effort has been made to provide light and adequate protection to this extraordinary collection and the great room with its slender column supporting two tiers of galleries makes an adequate frame for the treasures it contains.

The trustees of the Peter Bent Brigham Hospital early purchased part of the original twenty-acre tract on which the school buildings were erected. This hospital, now completed and occupied and containing two hundred and fifty beds with every essential for the care of the sick and the investigation of disease that modern science requires and which can supply.

Standing in the center is the graceful new white marble Infants' Hospital, seventy-bed; the new Children's Hospital of two hundred and fifty-bed, one of the most perfect plants in existence; the Huntington Memorial Hospital with about thirty beds devoted to the study of cancer; the Carnegie Food Laboratory; and the large central

powerhouse very near and toward the west are the Good Samaritan Hospital the Psychopathic Hospital and the Channing Home. Toward the east are the Dental School and the Animal Hospital. To the east the Living In Hospital will soon be added. A short distance away on the crest of Parker Hill is the recently completed Robert Bent Brigham Hospital one of the finest institutions for the care of the chronic sick in the world and just below on the Parkway is the Free Hospital for Women. Taken all together this is perhaps the most extraordinary existing group of modern hospitals of every variety clustered around a great medical school.

Within the city limits and in cordial relation with the Harvard Medical School are other great institutions. The Massachusetts General Hospital opened in 1821 is well known as one of the earliest and best in the country. Besides bearing upon it roll the names of Warren Bigelow Jackson Fitz and Richardson the Massachusetts General Hospital has the undying fame of being the site of the first successful demonstration of ether anesthesia in America's greatest contribution to the benefit of mankind. In the South End is the Boston



Lord H. Bradford M.D. F.A.C.S.
Dean of the Medical Faculty

City Hospital built half a century ago and one of the best American examples of a municipal institution. It maintains one thousand beds for the care of acute diseases, including contagious illness. The Boston Dispensary a century old recently much enlarged is situated in the center of the city.

The Carver Hospital stands on a hill in South Boston and in the harbor is the Long Island Hospital for the care of the chronic sick. In the West End is the Charitable Eye and Ear Infirmary housed in a new and admirable building and within moderate distance stands the McLean Hospital and the Boston State Hospital both for the care of the insane and the Naval and Marine Hospitals in Chelsea to which come sailors from all parts of the world.

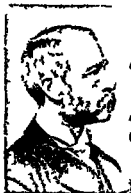
In all these institutions taken together are nearly five thousand beds and with their outpatient departments and convalescent homes they give treatment to at least half a million patients each year.

Any and all of these patients may become the subject of observation and study by the medical students. Furthermore these various institutions offer opportunities for recent graduates of the medical school to become house officers. The term of these internships varies from six months to two years and in some instances to longer periods. These positions vary not only in dura-



At left H. P. Bowditch A.B. M.D.
At right J. C. Wren A.B. M.D.

SURGERY GYNECOLOGY AND OBSTETRICS



D. W. Cheever A. B. M. D.



J. C. White A. B. M. D.
Three Professors Emeriti



F. C. Shattuck A. B. M. D.

on but also in the advanced work which they permit some being positions of residents surgical and medical open only to students who have already finished terms as house officers. Together there are about one hundred positions each year open to Harvard students usually upon the successful completion of a competitive examination. In some institutions Harvard students are preferred and in a few only Harvard students are accepted.

More than ninety per cent of the graduates of the Harvard Medical School take house officer positions before beginning the practice of their profession and this is strongly recommended by the school. Furthermore efforts are being made to place the state of Massachusetts to require a period of internship at some recognized hospital before awarding the state license to practice.

It needs no argument therefore to show that the clinical advantages the Harvard Medical School cannot be surpassed. Good and active use is made of these advantages neither they nor the school laboratories are yet crowded to the limit since the school can accommodate still more students than are at present enrolled. But ready signs of substantial increase appear and this year's catalogue contains the statement that the right is reserved to refuse applicants if the number admitted is as large as can be effectively taught.

Such is the plant of the medical school. The university and its sons may well be proud of it and the community which it is built to serve and abundant benefit from its work.

THE PRESENT AND FUTURE

The Harvard Medical School was among the first in the country to establish a four year

curriculum graded courses requiring examination test for advancement establishing the teaching of the fundamental medical sciences in preparation for the clinical branches. That the student should be able to profit by his opportunity he should be adequately prepared and the Harvard Medical School required as a requisite for admission a college education. Modern medicine has become so exacting in its demands that a preliminary science training in physics chemistry and biology is necessary before medical studies are entered upon and in addition to the A. B. or B. S. degree a year's work of college grade in these sciences is needed as a requisite for admission to the medical school. This rule is thoroughly enforced there being no probationers or special student the only exception being that students on the beginning of their third college years of exceptional excellence in scholarship and thoroughly prepared in their preliminary studies may be admitted if they can furnish certified evidence of excellent scholarship.

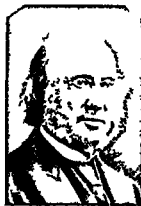
To diminish the financial burden of medical education upon the students of limited means scholarships and student aid are disbursed under the charge of a director who informs himself on investigation of the actual needs of students who apply for aid. Two ample traveling scholarships are awarded annually for European study to recent graduates.

The early medical school demanded instruction in few departments but a medical school today needs teaching in many branches. There are today at the present medical school 21 departments and a teaching force of 131.

In addition to the teaching of students an organized school for practitioners or post graduate school is conducted under a dean and adminis-



John Warren A.B. M.D.

J.B.S. Jackson A.B. M.D.
Three professors eminent in their day

G.C. Shattuck A.B. M.D.

trative board giving courses throughout the whole year. As many as five or six hundred attend themselves of the opportunities offered by this school.

A school for health officers and a school for the study of tropical medicine provide for the special education of those desiring to prepare themselves for special work.

The importance of affections of the teeth and mouth and their relation to general health is now generally recognized. The disease was early recognized by the founders of the Harvard Dental School who not only have elevated the art and science of dentistry but have made the value of the school known both in this country and abroad. The proportionate number of European students enrolled at the Harvard Dental School is probably larger than in any department of the university.

Recognizing the advantage to the community of a better knowledge of the nature of disease and its rational treatment and that the check to the spread of quackery is a general enlightenment of the community, a course of public lectures was instituted and has been given for the past six years in one of the large lecture rooms of the medical school. These lectures have been largely attended. They have been extensively noticed in the daily press. Several of these have been published by the university and issued in a small book form and have met with a ready acceptance.

The Harvard Medical School has grown as public need has increased from a successful preparatory school for young physicians to a medical center of high repute and an important part of Harvard University.

Instruction has been furnished under the administration of the Faculty of Medicine in the past year to more than 1,000 pupils as follows:

medical school 310 graduate school 552 dental school 193

The M.D. degree conferred for work at the medical school requires four years technical work at the medical school. It also demands as a rule four years work in the undergraduate department of a university with strict attention to scientific studies. The degree of Doctorate of Medicine is one of the most exacting in its requirements as the profession of medicine is one of the most exacting in its demands. The high degree of Doctorate of Public Health is conferred only on those who devote an additional year to the study of hygiene and represents one of the most important of degrees bestowed by the university.

A scrutiny of the catalogue of the school indicates how extensively and how well the field of medical study is occupied by the various departments now active in work.

RESEARCH WORK

Though a medical school is not primarily a research institute there is no reason why the teaching force should not engage also in research. The extent to which this is done is shown by work the value of which is recognized by the medical scientific world. The teacher becomes stale if he is not himself a researcher or in touch with research workers. The student also needs the inspiration of fresh knowledge. The alma mater nourishing with modified milk only will find her alumni lacking in the true bone salt of scholarship.

The list of the recent activities in the research department at the school is a long one among them can be mentioned here only a few of general recognized importance: the recondite and

important study of the chemical contents of the blood the law of normal alkalinity of the blood and write the chemistry of tissue change the relation of the nitrogen products of food to nutrition the physiological changes in the secretions influencing digestion and influenced by the emotions the chemistry of vibrated air studies in the filterable germs the pathological changes in the bone tissues in affections of the kidneys the relation of organic disease of the brain and the best classification of mental diseases the germ of whooping cough the laws of heredity in cancer the value of radium in the treatment of cancer and of method of application of radium in the treatment of cancer the laws affecting the growth of the embryo and the nature of the cell surgery of the nervous system and of the brain and the hypophysis.

It may be claimed at last that a beginning has been made in the establishment of what was the purpose of President Eliot and the promoters of the new medical school buildings namely the establishment of a medical university equipped in every way for the study of disease and the promotion of all knowledge needed for relieving human suffering.

STUDENT ACTIVITIES

The occupation of the new buildings in 1906 developed a new phase in student life at the school. Certain members of the building committee realizing the cramped condition of the students at the old school had provided for a large and accessible students room in the new Administration Building and upon the students fell the responsibility of the proper utilization of this room. Its furnishing and maintenance and a small textbook library became the object of a newly formed Students' Library Association and prompt subscription from the student body provided a well furnished lounge room with a piano Morris chairs large rug, and a well filled shelf of the more important textbook.

Subsequently as the association became better established it assumed other functions such as the welcoming of new students at reception in early October extension of the work of Phillips Brooks House in the medical school establishment of a historical society and co-operation with the faculty in the arrangement in certain courses. At present its membership comprises with but few exception the entire enrollment of the school and with yearly dues of \$1.00 the organization has an adequate financial

the association during the past year. Outside speakers of recognized ability have addressed the members on subjects related to medicine. Last spring George A. Gordon D.D. spoke on "The Physician as a Human Influence" and President Emeritus Eliot spoke on certain ethical and social aspects of the medical profession. Other student organizations—the Boston Medical Society, Alpha Omega Alpha and the Innominate Club—have agreed to give up some of their meetings in favor of the larger gatherings of the Association and in this way invited speakers are assured of a representative student audience.

To give space for the new central library in the Administration Building the Association has relinquished its room on the ground floor and established itself on the second floor above the faculty room leaving to the library however its small collection of textbooks. It is expected that this change of location alone will greatly increase the usefulness of the library to the students and the Brigham Hospital Library share the same room a well equipped reading room open during the evening is made permanently possible.

Still a long felt need at the school the association with the generous aid of the Medical School Alumni Association has furnished a pleasant room in the basement of Building A where the New England Kitchen Company serves excellent luncheon in the cafeteria plan. This cafe has been in operation since October 17, 1914 and its average attendance has been 150. The association owns the furniture of the kitchen and luncheon room and cooperates in every way with the caterers in the management of the lunches. More than anything since the establishment of the student room in 1906 this new departure in the association activities has proved valuable to the student. So many of them live away from the neighborhood of the school and their work is often so confusing that they are more likely to meet at lunch on than anywhere else. The access of these new rooms point to access in further attempts to unify and simplify the medical student existence—such access as a medical school union would most perfectly realize.

To the visitor the most interesting part of the medical school is perhaps the Warren Museum notwithstanding the fact that to the non professional mind a museum of anatomy is usually a place of horror suggesting a Danse Macabre in front a Gethsemane a place perhaps of service to the interests of the student but repellent to the rest.

That the Warren Museum can be an exception to this and offer to the thoughtful an unusual attraction is due not only to the tradition which is gathered around this remarkable collection representing nearly a century of zealous work but in part to the skill of the architect who has constructed a room flooded with light overlooking and placed in the center of a remarkable group of buildings devoted to the relief of suffering mankind.

The Warren Museum may be said to represent the heart of a great institution of medical learning and research. It is filled with carefully collected medical treasures laboriously brought together by men who in the past century thought earnestly and worked devotedly for the advancement of medical science. This is made evident by the group of marble portraits bringing to mind the recollection of remarkable men who may be regarded as now holding a perpetual session.

higher faculty of past masters of medical thought in deliberation over the science of medicine and what can be done to alleviate the ills of mankind.

If perhaps they wonder at the revelations of modern science and at the problem which confront their successors may they not also look forward to greater wonders yet to come from the great institution of learning study investigation which has grown up from the earnest beginnings and zealous efforts of those who labored devotedly in the past?

No one can visit the buildings of the Harvard Medical School without being filled with the impression that now here is the study and investigation of disease in its various manifestations conducted more earnestly and efficiently than in the group of buildings laboratories lecture-rooms and hospitals assembled under the direction of the Medical Department of Harvard University.

PRELIMINARY CLINICAL PROGRAM FOR BOSTON MEETING

MASSACHUSETTS GENERAL HOSPITAL

Monday

- C. A. PORTER—9 Operations Gastric Cancer of stomach.
D. F. JONES—9 Operations Cancer of rectum (distal stage).
R. C. CABOT, HUGH CABOT and OSCAR RICHARDSON—Demonstration Comparison of clinical evidence with postmortem findings.
HUGH CABOT et al.—2 Operation Epididymectomy for tuberculous Lithopexy for bladder Uterotomy for stone.
C. L. SCUDDER—3 Demonstration Fracture.
HUGH WILLIAMS—3 Demonstration Cancers.

Tuesday

- E. G. BRACKETT and R. B. OSGOOD—9 Operation Excision of knee, with bone plates Exploration of knee joint through median incision.
D. L. EDGELL—10 Clinic.
C. L. SCUDDER and H. F. HEWES—Demonstration Diagnosis and treatment of chronic gastric ulcer.
G. W. W. BREWSTER—Operations Hysterectomy for fibroids Appendectomy.
LINCOLN DAVIS—2 Operations Uterotomy for tumor Hysterectomy.
ROGER I. LEE and BETH VINCENT—Demonstration Splenectomy for pernicious anemia.
C. C. SIMMONS—3 Demonstration Omentum liti.
G. A. LELAND JR.—3 Demonstration Atheroma.

Wednesday

- F. G. BALCH—9 Operations Prostatectomy Abdominal tumor.
R. B. GREENOUGH—9 Operations Benign tumor of breast Cancer of breast.
Z. B. ADAMS, H. A. DAYFORTH and C. H. BUCHOLZ—10 Demonstration Scoliosis.
L. T. BROWN—Demonstration Postural defects.
FARRAR COBB—2 Operations Hysterectomy for cancer (Wertheim).
HUGH WILLIAMS—2 Operations Gall bladder.
R. C. CABOT, HUGH CABOT and OSCAR RICHARDSON—3 Demonstration Comparison of clinical evidence with postmortem findings.

Thursday

- HUGH CABOT et al.—9 Operations Nephrectomy for tuberculous Pyelotomy for stone Prostatectomy.
R. C. CABOT—Clinic.
ABNER POST—10 Demonstration Congenital syphilis.
E. G. BRACKETT and R. B. OSGOOD—2 Operations Open operation on hip G. saw osteotomy of knee joint.
C. A. PORTER, A. K. STONE, H. F. HEWES and J. B. HARTWELL—3 Demonstration Tuberculous cervical adenitis.
W. J. MIXTER—3 Demonstration Fracture of the skull.

Friday

- C. L. SCUDDER—9 Operations Duodenal ulcer Cancer of stomach Fracture of femur.

- R B GREENOUGH—9 Operations Cancer of jaw tongue or lip
 J C WARREN—10 Demonstrations Reminiscences of the discovery of ether
 C A PORTER—10 Demonstration C ses
 R H MILLER—6 Demonstration Tetan
 C A PORTER—2 Operations Tuberculous cervical adenitis Operation on peripheral nerve
 D F JOYCE—2 Operations Cancer of rectum (second stage)

Surgical Specialists

- A COOLIDGE, J P CLARK, H F MOSHER, D C CAMPBELL, W F KNOWLES, H A BARRETT, C ROBINSON and I L GARLAND—Eye ear nose and throat clinics, daily
 G H WRIGHT—Demonstrations in oral surgery
 J L COODALE—Demonstration The diagnosis and treatment of typhoid fever

BOSTON CITY HOSPITAL

Monday

- J B BLAKE, W E GAULLENER, and L R G CHANDON—9 Operations Surgical
 F S NEWELL, E B YOUNG, and N R MASO—2 Operations Gynecological
 G P S BROWN—3 Demonstration End results of tubercular treatment of lymphadenitis and tuberculosis
 F W WHITE, F B LUND, and R D LYON—4 Demonstration Diagnosis and treatment of ulcer and cancer of the stomach (medical surgical X-ray)

Tuesday

- F B LUND, F J COTTON, and D D SCANNELL—9 Operations Surgical
 PAUL THORNDIKE and assistants—Operations Genito-urinary
 FUL THORNDIKE—3 Demonstration Prostatectomy Renal calculus
 HORACE BIRNEY—4 Demonstration Treatment of tumors of the bladder with the high frequency current

Wednesday

- E H NICHOLS, H A LOTTE, and J C HUBBARD—9 Operations Surgical
 J B BLAKE, W E GAULLENER, and L R G CHANDON—1 Operation Surgical
 J B BLAKE—3 Demonstration Splenectomy for splenic disease
 A R KIMPTON—4 Demonstration Transfusion by the use of glass cylinders Bone tumors Resection of the stomach for sarcoma

Thursday

- PAUL THORNDIKE and assistants—9 Operations Surgical
 F B LUND, F J COTTON, and D D SCANNELL—9 Operations Surgical
 F J COTTON—3 Demonstration Artificial impactions in fracture of the hip Joint ankylosis Separation of the lower epiphysis of the femur

- F B LUND—4 Demonstration Results of operative treatment of fractures, particularly with Parham and M run band

- J H COVINGTON—4 3 Demonstration Congenital cystic kidney Results of operations for intestinal tuberculosis Nephrectomy for acute unilateral hematuria sections of the kidney

- F H LAKEY—5 Demonstration Cardiospasm Carcinoma of the jejunum Resection of the rectum with peritonitis

Friday

- F S NEWELL, E B YOUNG, and N R MASO—9 Operations Gynecological
 E H NICHOLS, H A LOTTE, and J C HUBBARD—9 Operations Surgical
 E H NICHOLS—3 Demonstration Results and methods of operating for osteomyelitis Cervical abscess
 H A LOTTE—4 Demonstration A new operation on the frontal sinus
 J C HUBBARD—5 Demonstration Saccom of the femoral division of the transverse colon Perforation of duodenal ulcer Transverse duodenal removal of a gallstone Rupture of the liver
 J connection with the operative clinics, special demonstration will be given where possible of special methods of anesthesia Tracheal anesthesia etc by J L BROWN
 F L RICHMOND, and N N MOSHER

CHILDREN'S HOSPITAL

Orthopedic Department

- R. W. LOVELL, A THORNDIKE, ROBERT SOUTHERN, A HARRIS, A T. LEE, J. W. SEVER, and H. J. FITZGERALD—Daily 9 to 11 Orthopedic operations Reduction of congenital dislocation of the hip by various methods and especially by a special Chinese Tendon transplantation capule retractor and infantile paralysis The use of silk ligament in infantile paralysis The operation of correction of clubfoot The Hobbins and Albee operations for tuberculosis of the spine The operative treatment of spastic paralysis Operations for congenital Bone transplantsations
 R. W. LOVELL—Monday 3 to 5 Demonstration Treatment of infantile paralysis by muscular transfer with exhibition of patients The treatment of scoliosis by forcible jacket Application of jacket and demonstration of results
 ROBERT SOUTHERN—Monday 4 to 5 Monday Demonstration Exhibition of the results of the operative treatment of infantile paralysis
 E. G. MARTIN—Monday 3 to 5 Demonstration Apparatus to determine the strength of muscles affected by infantile paralysis with conclusion to draw from observations made by it
 J. J. THOMAS and J. W. SEVER—Monday 4 Demonstration Obstetrical paralysis and fracture of the acromion process simulating a Monday Tuesday and Wednesday Demonstration Treatment of paralysis by muscular transfer
 A. THORNDIKE—Monday 4 to 5 Demonstration End results in osteoplastic operation for spinal tuberculosis

FRANCY BROWN—Monday 4:30 Demonstration Röntgen results in osteoplastic spinal operations Thursday 4 Demonstration Result of röntgen investigation in cases of fibrous stenosis of the pylorus in children Daily 10 to 4 Exhibition of röntgenograms, röntgen department

ROBERT SOUTHER—Thursday 3 Operation A new operation for flexion contraction of the thigh in infantile paralysis

A T LECO—Thursday 3:30 Operation Transplantation of the origin of the pectoral major muscle in paralysis of the shoulder

A EISENBERG—Thursday 2:30 Demonstration Multiple enchondroma

H J FRIEDMAN—Monday Tuesday and Wednesday 3 Demonstration Treatment of scoliosis with methods in use cases and record Thursday 4 Demonstration Apparatus for reduction of congenital hip dislocations

PROF. ERNEST FOLY, HUNT CANNON and W. B. CHESBROUGH—Thursday 4:30 Infantile paralysis

Visit to orthopedic ward daily to Tuesday new hospital buildings will be open to inspection by Tuesday 9 to 10

Surgical Department

J S STONE, W E LADD, C C MYER and T. V. MEXER—Daily 11 to 1:30 Typical operations: cleft palate, empyema, hernia, cervical webbed fingers, hypospadias, undescended testis

C G MIXER—Tuesday 3:30 Demonstration perfect and ectopic anus Wednesday 2:30 Demonstration Tuberculous peritonitis Pyloric stenosis Undescended testis

W E LADD—Tuesday 2:30 Demonstration Cervical adenitis Wednesday 3:30 Demonstration Intussusception, Harelip and cleft palate

J S STONE, W E LADD and J J THOMAS—Tuesday 2:30 Demonstration Fractures in children: peroneal and cubital elbow joint fracture Volkman's ischemic contractures

J S STONE—Wednesday 2:30 Demonstration on obscure abdominal conditions: Empyema, Harelip and cleft palate, Acute epiphyseal lesion

T W HARMER—Wednesday 3:30 Demonstration The treatment of birthmarks

PROF. ERNEST FOLY, HUNT CANNON, WOLBACH, D. S. LOVETT, STONE and MORSE—Tuesday 4:30 Cervical adenitis

Drs. CROSBY, GREEVE and F. E. GARLAND—Thursday 11:00 Eye, Ear, Nose and Throat clinic Visit to general surgical ward daily to Tuesday

PETER BENT BRIGHAM HOSPITAL

HARVEY CUMING—Daily Clinics or demonstrations Surgery of the brain, pituitary body, spinal cord, peripheral nerves

DAVID CREEVER and JOHN HOMANS—Daily Operations Surgical

HENRY A. CHRISTIAN, CHANNING FROTHINGHAM and others of the medical staff will co-operate in giving clinics or demonstration on selected topics such as the electrocardiogram, etc.

MASSACHUSETTS HOMEOPATHIC HOSPITAL

Monday

A G HOWARD and H MOORE—9 Operations Orthopedic

J H PAYNE and D W WELLS—9 Operations Eye

DR. RICE, HOUGHTON and C SMITH—Operations Nose and throat

W F WESSELHOFF and T E CHANDLER—2 Operations General surgery

Tuesday

J F BIGGS and C T HOWARD—9 Operations General surgery

G A SUTTER and A W HERR—9 Operations Eye

H O ACE, PACLAUD and C T HOWARD—2 Operations General surgery

DR. RICE, HOUGHTON and SMITH—2 Operations Nose and throat

Wednesday

DR. RICE, HOUGHTON, JOHNSON, SMITH and BLISS—9 Operations Nose and throat

GEORGE H EARL and H MOORE—9 Operations Orthopedic

W F WESSELHOFF and R C WIGGINS—2 Operations General surgery

F W COLBURN—2 Operations Ear

Thursday

J E BRIGGS and C CRAVE—9 Operations General surgery

DR. RICE, HOUGHTON and C SMITH—9 Operations Nose and throat

G R SOUTHWICK—Operations Gynecological

Demonstrations

W H WATTERS—Surgical pathology

G A SUTTER—Ophthalmology

Routine Examination of Abdominal Cases—Wednesday 10

Social Service Clinic Post partum Cases—Thursday 2

Daily clinics in twilight sleep

Daily exhibition of new maternity building

TUFTS MEDICAL SCHOOL

A W GEORGE—Daily to 5 Röntgenological demonstration

CARNEY HOSPITAL

J T BOTTOMLEY and D F MAHONEY—Monday Wednesday and Friday 9 Operations Surgical

W R MACAULAN and A R MACAULAND—Monday Wednesday and Friday 9 Operations Orthopedic

F W JOHNSON and S RUSHMORE—Tuesday and Thursday 9 Operations Gynecological

FREE HOSPITAL FOR WOMEN

DR. GRAVES, PEMBERTON, WADSWORTH, HUTCHINS and BAILEY—Tuesday, Wednesday and Thursday 9 Operations Gynecological

DR PEMS STON—Wednesday 3 30 Cystoscopic demonstration
 DR HITCHINS—Thursday 3 30. Demonstrations Laboratory specimens.

ST ELIZABETH'S HOSPITAL

Drs LAZAR and SUTTER—Monday and Thursday 9 Operations
 Dr CARR—Monday Thursday and Friday Ward out. Wednesday 9 1 tracheostomy and anastomosis
 Dr BROOKBANK—Tuesday 9 Orthopedic operations and clinic
 Dr CHUTE—Wednesday and Friday 9 Operations Genito-urinary
 Drs BRAINERD and HOLMES—Tuesday 9 Nose and throat clinic
 Dr DOWNING—Monday and Friday 11 Demonstrations Laboratory technique
 Dr BUTLER—Tuesday and Thursday 1 Demonstrations X-ray
 Drs McDONALD and McDONALD—Wednesday 1 Eye clinic

The history, diagnosis, and indication for operation in each case will be discussed previous to operation by Dr Cronin of the medical service and Dr Butler of the surgical department.

ROBERT BRIGLIAM HOSPITAL

CHARLES F. FAIRYER EDWARD RICH EDSON LLOYD T. B. W. and RICHARD MILLER—Tuesday and Thursday—1 Operations Monday Wednesday and Friday 3 Clinics Surgery of chronic diseases, arthritis, intestinal tuberculosis, peritoneal adhesions, hemolytic diseases.

LONG ISLAND HOSPITAL

F. H. LARNEY—Monday 1 Operations.
 J. H. CUNNINGHAM—Tuesday and Wednesday Operations.
 ROBERT SOUTHER—Thursday and Friday Operations.

NEW ENGLAND HOSPITAL FOR WOMEN AND CHILDREN

MARY A. SMITH and ARMY M. O'KEEFE—Monday and Thursday 10 Operations Gynecological
 ELIZABETH T. GRAY and LETITIA D. ADAMS—Monday Tuesday 1 Operations Gynecological
 EMMA H. CULBERTSON and CLAYTON COOPER—Tuesday and Friday 1 Operation Gynecological
 FLORENCE DE LUKE and LETITIA D. ADAMS—Wednesday 10 Thursday Operations Gynecological
 MAUDE CARVILL—Thursday 5 clinic
 MARGARET MOYER—Wednesday 10 Nose and throat clinic.
 ISABELLE D. KERR—Friday 9 Ear nose and throat clinic.

Scopolamine-morphia anesthesia both with and without ether will be used during these clinics. Statistics covering 10 years continuous use of this form of surgical anesthesia on over 1470 cases are available. Dr Abby M. O'Keefe professional anesthetist has entire charge of this department.

HOUSE OF THE GOOD SAMARITAN

Drs SUTTER, LEON and SEVER—Monday Wednesday and Friday 10 Clinics Infantile paralysis, muscular transplantation, flaccid condition of the head of the femur, electrical paralysis.

CODMAN HOSPITAL

1 A. COOK—Tuesday 1 Operations Surgical. Demonstration of lesions about shoulder joint.
 Thursday 10 Operations Surgical. Demonstration of lesions of duodenum.

MASSACHUSETTS CHARITABLE EYE AND EAR INFIRMARY

Drs CROCKETT MORRIS and FINE SON—Monday and Friday Otolaryngological clinic.

Dr J. JACK WALKER POWERS and BLODGETT—Tuesday Otolaryngological clinic.

Drs HAMMOND, WHITE and FAY—Wednesday Otolaryngological clinic.

Drs JACK KNOWLES, T. BRET and BOGAN—Thursday Otolaryngological clinic.

5 clinic held by from 9 to 11 15 various operations on lids, tear sac and muscles of the eye. Different types of operation for cataract and glaucoma. Magoon operations for the removal of foreign bodies from the eye. Different method of using local anesthesia. Trachoma of the eye. Interstitial keratitis of specific origin. Ophthalmia neonatorum and gonorrheal ophthalmia in adults. Localization of foreign bodies in the eye by the X-ray. Demonstration of ophthalmometer for measuring astigmatism of the lens. Demonstration of latent defects by pathological department.

HARVARD MEDICAL SCHOOL

PROF. COL. CILMAN and MALLOY—Demonstration Pathology

PROF. CANNON and W. T. PORTER—Demonstration Physiology

PROF. HOLLY—Demonstration Chemistry

PROF. STROUD—Demonstration Tropical Medicine

PROF. REID HUNT—Demonstration Pharmacology

Drs ORDWAY and TYZZER—Demonstration Cancer research

JOHN WARREN—Demonstration Anatomy

W. F. WHITNEY—Demonstration Warren anatomical museum

F. T. LEWIS—Demonstration Embryology

J. E. GOLDTHWAIT—Demonstration Microtopons.

